ORLANDO • MELBOURNE INTERNATIONAL AIRPORT • MLB

ORLANDO MELBOURNE INTERNATIONAL AIRPORT

Master Plan Update

April 2018

Prepared for:
Melbourne Airport Authority
One Air Terminal Parkway, Suite 220
Melbourne, Florida 32901

ESA

Orlando Melbourne International Airport

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Melbourne Airport Authority
One Air Terminal Parkway, Suite 220
Melbourne, Florida 32901

by

Environmental Science Associates
4200 West Cypress Street, Suite 450
Tampa, Florida 33607

and

Airport Engineering Company, Inc.

C&S Engineers, Inc.

GAI Consultants

Kimley-Horn and Associates, Inc.

Quadrex Aviation, LLC

Smith & Associates

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CHAPTER 1

Introduction

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Introduction

1.1 Introduction

The Melbourne Airport Authority (MAA) is updating the Master Plan for the Orlando Melbourne International Airport (MLB). The Airport Master Plan was last updated in 2004. Since that time, there has been substantial change in the aviation industry and the national economy that has affected MLB, the City of Melbourne, Brevard County, and the Space Coast of Florida. Notwithstanding the effects of the 2008 economic downturn, MLB has experienced notable growth over the last several years in aviation and military research, education and training, aircraft manufacturing and assembly, and aircraft maintenance. During this period, the MAA has implemented substantial airport improvement projects to accommodate the growth and has also diversified and increased non-airline revenue. For these reasons, the time is ripe to update the Airport Master Plan and look forward to the next several decades of growth at MLB.

1.1.1 Master Plan Update

The Federal Aviation Administration (FAA) defines an Airport Master Plan as a comprehensive study of an airport that usually describes the short, intermediate, and long-term development plans to meet future aviation demand.[1] The Florida Department of Transportation (FDOT) also notes that an Airport Master Plan "reports the data and the logic upon which the plan is based in a narrative format, and displays the ultimate development concepts graphically in an Airport Layout Plan (ALP) set of drawings." [2]

This update to the Airport Master Plan provides the MAA a strategic guide for airport development through 2035. The Airport Master Plan documents MAA's vision and overall plan for the airport, proposes an airport development program, and identifies anticipated revenues and capital expenditure outlays. The strategic planning for this update to the MLB Master Plan is built around several core principles: aviation safety; meeting the needs of airport users, passengers, and tenants; efficient use of airport property and orderly development of facilities; and a reasonable and achievable Capital Improvement Plan. Input from airport users, tenants, local governments, businesses, and surrounding neighborhoods and communities is important to the success of the plan.

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[1] *Airport Master Plans.* Federal Aviation Administration. Advisory Circular 150/5070-6B, Change 2. January 27, 2015.

[2] *Guidebook for Airport Master Planning*. Florida Department of Transportation, Aviation Office. April 2010.

The FAA recommends that airport owners update their Airport Master Plans periodically (every five to seven years) to document the existing and future operational capabilities of the airport, to enhance safety, or to identify needed facility and capital improvements. For FAA Airport Improvement Program (AIP) funding eligibility purposes, the FAA also recommends that the ALP be updated periodically, or on an as-needed basis, to depict compliance with FAA airport design criteria and any changes to existing and proposed facilities.

1.1.2 Airport Layout Plan Update

A key product of an Airport Master Plan is a collection of drawings that comprise the ALP drawing set. These drawings provide a graphic representation of existing facilities and the overall development plan for an airport. The primary drawing in the ALP drawing set is the Airport Layout Plan. The other drawings in the ALP drawing set provide detail on terminal facilities, runway approaches, airspace and obstructions, land use, and airport property. FAA approval of the ALP is necessary for MAA to receive financial assistance under the terms of the *Airport and Airway Improvement Act of 1982*, as amended. FAA AIP grant assurances also include the requirement for an airport owner to keep the ALP current and updated. While the Airport Master Plan was last updated in 2004 and approved by the FAA in 2006, the current interim ALP was updated and approved by the FAA in 2012.

1.1.3 Planning Horizon

This Master Plan update covers a planning period of 20 years. The planning period is divided into three periods: short-term (upcoming 5 years), intermediate-term (6 to 10 years), and long-term (11 to 20 years). The intermediate and long-term planning periods are typically considered strategic in nature and help to ensure that near term actions are consistent with longer term development needs.

1.1.4 Project Funding

Funding for this Master Plan update was provided by the Federal Aviation Administration, the Florida Department of Transportation, and the Melbourne Airport Authority.

1.2 2004 Master Plan Update

The 2004 Master Plan Update identified the following issues to be addressed at MLB:

- Identification and development of conceptual improvements for transportation linkages related to cargo and passenger movements
- Identification of long-term requirements associated with general aviation (GA) facilities
- Relocation of aviation facilities used by the Florida Institute of Technology (FIT)

- The demand for improved ground transportation strategies to meet the Airport's access and egress needs, including improved access to Interstate Highway 95 (I-95)
- Efficient use of airport land
- The MAA's future intentions relative to land associated with Trailer Haven Mobile Home Park (now Tropical Haven)
- The need for a centrally located aircraft parking apron and run-up pad
- The need for the extension of Runway 9R/27L and 9L/27R and a connecting taxiway between the threshold of the approach end of Runway 9R and the threshold of the approach end of 9L
- Alternatives associated with the development and growth of the air cargo industry at MLB
- Off-airport land use and noise compatibility
- Air service enhancement
- Coordination with the local Metropolitan Planning Organization (MPO) and Florida Department of Community Affairs (now Department of Economic Opportunity) to satisfy Development of Regional Impact (DRI) review requirements

1.3 Current Master Plan Goals, Objectives and Key Issues

1.3.1 Goals of this Master Plan Update

The overarching goals for this Master Plan update are to:

- Prepare a Master Plan update that is useful to the MAA and MLB management and is informative to local officials and the public
- Meet FAA's Airport Geographic Information System (AGIS) mandate for airport mapping
- Update the airport's "Exhibit A" Property Map to ensure compliance with AIP grant assurances
- Update the MLB ALP drawing set to reflect recent development, proposed development, and meet current FAA requirements for ALP drawings

1.3.2 Objectives

The planning effort will strive to:

- Enhance customer and airport user safety, service, and experience
- Enhance revenue and economic development efforts
- Enhance airport operational efficiencies
- Meet federal grant obligations, FAA design standards, and policies
- Refine land use, land development plans, and land acquisition strategies
- Consider environmental impacts, stewardship, and sustainability
- Ensure orderly development: consider short-term needs and long-term plans
- Provide for meaningful involvement in the planning process by the public, airport users (e.g., passengers, general aviation pilots, tenants, etc.), and agencies
- Capitalize Airport and Project branding

1.3.3 Key Issues

A number of key issues or concerns were noted at the outset of this planning effort. Consistent with the broad goals and objectives outlined above, the plan will attempt to:

- Identify long-term requirements associated with GA facilities
- Accommodate future land and facility requirements of existing tenants and potential new tenants
- Continue plans to provide better ground access to and from the airport including an improved linkage with I-95
- Provide seamless intermodal connections including linkages between air, rail, surface, port and space activities
- Maintain efficient passenger processing
- Review plans for extension of Runway 9R/27L and a connecting taxiway between Runway 9R and 9L thresholds
- Replacement of the existing airport traffic control tower (ATCT)
- Ensure compatibility with airport Navigational Aids and other operational criteria
- Provide for development and growth of air cargo and enhanced air service
- Address drainage issues
- Address future land needs

1.4 Airport History and Recent Development

1.4.1 Airport History Overview

In 1933, the City of Melbourne acquired 160 acres west of the Indian River and established a location for a new municipal airport. During World War II, the U.S. government acquired the airport and developed it as Naval Air Station Melbourne. The facility trained Navy and Marine pilots and housed German prisoners of war.[3] The Melbourne Airport was deeded back to the City in 1946 under the Surplus Property Act and was once again operated as a municipal airport.

In 1952, Eastern Airlines initiated commercial air service at the then Melbourne Municipal Airport, and scheduled commercial flights have been provided at the airport since that time. In 1967, the Melbourne Airport Authority was created by the City of Melbourne for the purpose of operating the airport. In 1990, the new passenger terminal building was completed and the airport was renamed as the Melbourne International Airport in 1993. In 1995, the International Terminal and air freight facility opened. See Section 1.4.3 for a description of recent major developments at MLB.

1.4.2 Florida's Space Coast

For more than 50 years, Brevard County has been the home of the nation's manned and unmanned space flight programs. In addition to NASA's launch facility headquarters at Kennedy Space Center, the area also has Cape Canaveral Air Force Station and Patrick Air Force Base, all of which play a major role in the nation's space program. The ending of NASA's Space Shuttle program in 2011 resulted in a loss of approximately 8,000 NASA and civilian jobs over the course of a decade. The impact of the end of the shuttle program on local communities was compounded by the 2008 recession and its aftereffects. Community leaders and the MAA, anticipating the end of the shuttle program, worked diligently to not only maintain, but grow, Florida's Space Coast as a hub for aerospace, defense, aviation, and technology industries. Presently, the Space Coast has 48 engineers per 1,000 workers; more than any other Florida metro area or any of the 25 most populated metros in the country.[4] This region also has the most concentrated high-tech economy in the state of Florida and the 16th most concentrated in the nation.[5] As a result, thousands of jobs were created in the region. Of particular note, MLB has become a focal point for job creation in the Space Coast region with major aerospace and aviation companies bringing new opportunities and thousands of jobs to the Melbourne area. In 2015, more than 6,000 people are employed by aerospace and aviation-related companies at MLB.

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3 Melbourne Airport Authority. http://www.mlbair.com/AirportOperations/Newsroom/History.aspx. Accessed February 23, 2015.

4 Economic Development Commission of Florida's Space Coast. http://spacecoastedc.org.

5 Ibid.

1.4.3 MLB as an Aviation and Business Hub

MLB is a thriving hub for aviation, aerospace, and high-technology business. The airport's infrastructure and engineering-oriented workforce has attracted businesses that contribute over $1 billion of annual economic impact.[6] Brevard County has one of the largest Foreign Trade Zones in the United States, including hubs at MLB, and offers five transportation options: space, sea, highway, rail, and air. The area also boasts superior infrastructure for international trade including easy access to one of the busiest seaports in the country (with roll-on/roll-off capability), an extensive freight railway system, major interstate highways, plus launch pads for commercial space access.[7] **Table 1-1** provides an overview of the aviation and aerospace businesses on or in the immediate vicinity of MLB. **Table 1-2** provides and overview of other businesses and institutions at MLB.

TABLE 1-1
AVIATION AND AEROSPACE BUSINESSES AT OR ADJACENT TO MLB

Aircraft Assembly and Manufacturing	• Embraer Executive Jets • Discovery Aviation
Aircraft Maintenance Repair and Overhaul (MRO)	• STS Repair and Modification, LLC • Apex Executive Jet Center • AAR Corporation • FIT Aviation • Heck Air
Aviation Training	• FIT Aviation • East Florida State College
Avionics	• Rockwell Collins • Avidyne Corp • Southeast Aerospace • LiveTV • Symetrics
Space, Aerospace, and Defense	• Harris Corporation • Northrop Grumman Corporation • L3 Communications • DRS Tactical Systems

SOURCE: Melbourne Airport Authority, 2015; ESA, 2015.

6 *Where High Altitude Meets High Tech*. Melbourne Airport Authority. 2015.
7 Ibid.

TABLE 1-2
TECHNOLOGY, HEALTHCARE, EDUCATION AND OTHER BUSINESSES AT MLB

Transportation	• General Electric
Health Care	• Kindred Hospital • Circles of Care
Technology	• Florida Tech (FIT) Research Park • Ricoh USA • Revolution Technologies
Education	• Florida Institute of Technology • Keiser University • East Florida State College
Lodging	• Suburban Extended Stay hotel

SOURCE: Melbourne Airport Authority, 2015; ESA, 2015.

1.4.4 Recent Airport Growth and Development

In recent years, the airport has experienced tremendous growth with new and/or expanded facilities by its major tenants, including:

- Sheltair Aviation – a hangar developer at MLB since 1988. The company has constructed numerous T-hangar buildings and several aircraft storage and maintenance hangars at the airport.
- Apex Executive Jet Center (FBO) – established a new FBO facility and aircraft maintenance hangar in 2008 (formerly Baer Air) and then expanded with another hangar and additional apron space in 2017.
- Embraer Executive Jets – the company selected MLB in 2008 to establish its North American Phenom 100 and Phenom 300 assembly and showroom facility. In 2012, the company announced a major expansion of its campus at MLB with the addition of new facilities and the Embraer Engineering and Technology Center USA for research and product development, in effect doubling its initial presence.
- Florida Institute of Technology Research Park (Florida Tech Research Park) – in 2009, the Melbourne Airport Authority and FIT set aside a 100-acre parcel for use as a technology park to enhance and expand Brevard County's technology-research infrastructure and create jobs for the Space Coast. FIT actively promotes the Florida Tech Research Park to attract business, government, and academic allies to identify, facilitate, and accelerate innovation so it can more rapidly be brought to market.
- Kindred Hospital – the long-term, acute care hospital was opened within the Airport Industrial Park (2010)
- Discovery Aviation – since 2011, the company manufactures aircraft (Discovery XL-2 and Discovery 201) and produces aerospace composite structures at MLB

- Florida Institute of Technology (Aviation Programs) – located at the airport since 1968, FIT Aviation relocated and modernized its education, flight training, research, and FBO facilities (2009)
- STS Repair and Modification, LLC – established a maintenance, repair, and overhaul (MRO) station at MLB in 2017, primarily servicing commercial service airline aircraft. They took over the 83,000 square foot state-of-the-art hangar at MLB that was previously occupied by AeroMod International.
- Northrop Grumman Corporation – located at MLB since 1987, has recently initiated a $500 million capital investment to expand its aerospace and defense-related research, engineering, development, testing, production facilities at MLB (ongoing)
- Harris Corporation's continued investment in its headquarters located adjacent to MLB
- Other notable MLB tenants include AAR Corporation (aircraft maintenance), Southeast Aerospace (aerospace components and services), Circles of Care (hospital), Rockwell-Collins (aerospace and defense), and several technology firms, such as Ricoh USA and Revolutions Technologies.

1.4.5 Recent Capital Improvement Projects

Major capital improvement projects undertaken at MLB by the MAA from 2004 through 2015 are listed in **Table 1-3**. These projects were funded through monies provided by the FAA, FDOT, and/or MLB.

1.5 Airport Location, Aeronautical Role, and Ownership

1.5.1 Location

MLB serves the travel needs of the City of Melbourne, Brevard County, Indian River County, and adjoining areas. MLB is located in southern Brevard County, approximately two miles northwest of downtown Melbourne. The airport is also located approximately five miles northwest of the City of Palm Bay, 27 miles south of Port Canaveral, 45 miles south of Kennedy Space Center, and 54 miles southeast of downtown Orlando. The location of the airport and its regional setting are shown in **Figure 1-1** and **Figure 1-2**.

1.5.2 Aeronautical Role

1.5.2.1 National Plan of Integrated Airport Systems

There are 100 public use airports in Florida included in the FAA's National Plan of Integrated Airport Systems (NPIAS)[8]. Of these, 19 are listed as Primary airports, which provide scheduled air carrier service to 10,000 or more enplaned passengers per year. The NPIAS currently defines

[8] *Report to Congress, National Plan of Integrated Airport Systems (NPIAS) 2015 - 2019.* Federal Aviation Administration. September 30, 2014.

the role of MLB as a non-hub Primary Airport. This means that the airport serves 10,000 or more enplaned passengers per year, but less than .05 percent of all commercial enplanements nationally (equates to approximately 369,500 enplanements in CY 2013). Inclusion in the NPIAS allows the Melbourne Airport Authority to be eligible to receive federal grants from the Airport and Airway Trust fund through the FAA's AIP. The Airport and Airway Trust fund is supported by user based fees and taxes (user fees, fuel taxes, and other similar aviation-related revenue sources).

SOURCE: DeLorme Street Atlas USA, 2000; ESA, 2016

FIGURE 1-1
LOCATION MAP

SOURCE: DeLorme Street Atlas USA, 2000; ESA, 2016

FIGURE 1-2
REGIONAL AREA MAP

TABLE 1-3
MAJOR CAPITAL IMPROVEMENT PROJECTS (2004-2015)

Year	Project
2004	• Improve Terminal Building (Departure Lounge and Food Court; Security Checkpoint Improvements; Baggage Screening Facility; and Police Facility Renovations)
2005	• Construct Northside Parking Lot • Rehabilitate Taxiway “C” south of Runway 9R/27L • Acquire Aircraft Loading Bridge • Security Enhancements
2006	• Re-seal Terminal Apron • Overlay Taxiways “K” and “Q” north of Runway 9L/27R
2007	• Construct Service Roads • Rehabilitate Taxiway “Q” south of Runway 9R/27L • Construct Central Apron and Stormwater Management System • Taxiway Lighting Improvements
2009	• Perimeter Fencing Improvements • Terminal Parking Lot Improvements • Construct Covered Pedestrian Walkways - Phase 1 • Acquire Aircraft Rescue & Fire Fighting Vehicle • Replace Airport Rotating Beacon
2010	• Security System Improvements • Replace PAPIs on Runway 5/23 • Rehabilitate Taxiway Lighting and Signs • Rehabilitate Taxiways and Aprons • Rehabilitate Taxiway “A” East of Taxiway “R” • Widen Taxiway “K” – Phase 1 • Rehabilitate portions of Runway 9L/27R • Construct Taxiway “G” • Improve General Aviation Drive • Rehabilitate Bituminous Portion of Terminal Apron
2011	• Improve Terminal Access Road • Construct Covered Pedestrian Walkways - Phase 2
2012	• Acquire Aircraft Rescue & Fire Fighting Vehicle • Acquire Runway Sweeper • Sanitary Sewer for Airport Maintenance Department Facility • Rehabilitate Taxiway “V” and South T-hangar Taxilanes
2013	• Construct Taxiway “F” • Extend Taxiway “V” • Expand Central Apron
2015	• Construct Cargo Apron - Phase I • Construct Taxiway Connector S1 between Taxiways "K" and "S" • Widen Taxiway "K" – Phase 2 • Widen Taxiway “K” between Taxiways “M” and “C” (Design) • Northside Access Road (Design)

SOURCE: Melbourne Airport Authority, 2014; FAA Airport Improvement Program (AIP) Grant Histories, http://www.faa.gov/airports/aip/grant_histories/, accessed February, 2015.

1.5.2.2 Florida Aviation System Plan 2025

The FDOT's *Florida Aviation System Plan (FASP) 2025* includes 129 public use airports located throughout the state. The FASP identifies the Orlando Melbourne International Airport as one of Florida's 19 Commercial Service airports. The FDOT's Orlando Melbourne International Airport profile identifies MLB's Commercial Service role as supporting tourism, business, air cargo, and international flights.[9] The FDOT also highlights the fact that MLB supports general aviation, including flight training, corporate aviation, tourism, recreation/sport, pleasure, and business flights. For the purpose of this Master Plan update, it is assumed that MLB will continue its role as a Commercial Service airport with a strong general aviation component throughout and beyond the 20-year Master Plan update planning period. Inclusion in the FASP makes MAA eligible for grants through the Aviation Grant Program which is funded from the State Transportation Trust Fund. The Florida State Transportation Trust Fund is supported in part by a 6.9 cent per gallon tax on aviation fuels.

1.5.3 Ownership and Management

In 1967, Melbourne Airport Authority was established as a special board by the City of Melbourne to independently operate the airport. The MAA was granted jurisdiction and powers to control, supervise, and manage MLB. This includes the ability to enter into lease agreements, granting concessions, and employing personnel. The MAA's seven-member board serves two-year terms. The Melbourne City Council appoints three of the members while the City's Chamber of Commerce and Airport Industrial Park tenants appoint one member each. The final two members are selected by the balance of the board. An Executive Director, the Director's executive team, and administrative staff manage the day-to-day operation of the airport, as well as short- and long-range planning, security, maintenance, and construction.

1.6 Relevant Recent Airport Studies

1.6.1 2012 Airport Air Service Profile

In 2012, the FDOT prepared Air Service Profiles for Florida's commercial service airports[10]. The purpose of the study was to: 1) inform Florida's commercial service airports of the travel patterns of their communities so they can operate their airports more efficiently and, 2) communicate this information to the airline industry, allowing them to make improved service delivery decisions. Based on 2010 data, the report provided summary information on MLB enplanements, markets, international flights, seasonal flights, average load factors, and market leakage.

[9] *Melbourne International Airport Profile*. Florida Department of Transportation, Aviation and Spaceports Office. November, 2010.

[10] *2012 Airport Air Service Profile, Melbourne International Airport*. Prepared by Kimley-Horn and Associates, Inc. for the Florida Department of Transportation. May 2012.

1.6.2 Florida Statewide Aviation Economic Impact Study (2014)

In 2014, the FDOT prepared an update to FDOT's 2010 *Florida Statewide Aviation Economic Impact Study*. The *Florida Statewide Aviation Economic Impact Study*[11], published in August 2014, summarizes the significant economic benefit that Florida receives each year from aviation. The study concluded that for all benefit categories measured, aviation in Florida is responsible for an estimated $144 billion in annual economic activity or output. A study of individual Florida airports showed that MLB was a major economic engine for the area.

1.6.3 MLB True Market-Leakage Study

In 2014, the MAA commissioned a study[12] that evaluated passenger activity at MLB and conducted an analysis of markets and destinations of MLB passengers. The study documented the air travel patterns of people in Brevard County and adjoining areas.

1.6.4 Airport Traffic Control Tower Siting Study

In late 2014, the MAA commissioned a study to evaluate potential locations for the development of a new, modern airport traffic control tower at MLB. The project includes an Environmental Assessment, design of the new ATCT, and cost estimates. This study will inform the Master Plan update planning process and ALP update as to the possible location of a new ATCT at the airport.

1.6.5 Terminal Transformation Master Plan

In late 2014, the MAA commissioned a Terminal Transformation Master Plan. The purpose of the plan is to evaluate options, recommend improvements, and prepare budgets to update and modernize the passenger terminal building.

1.6.6 MLB Economic Impact Study Update

MLB staff is presently conducting a study to measure the local economic impact generated by MLB and its tenants.

[11] *Florida Statewide Aviation Economic Impact Study – Technical Report*. Florida Department of Transportation, Aviation and Spaceports Office. August, 2014.

[12] *True Market-Leakage Study, Melbourne International Airport, Melbourne, Florida*. Sixel Consulting Group, Inc. August, 2014.

CHAPTER 2

Existing Conditions

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Existing Conditions

2.1 Introduction

This section of the Orlando Melbourne International Airport (MLB) Master Plan update provides summary information on existing airport facilities and airport-related information, including regional meteorological conditions). This, in conjunction with other information analyzed in this Master Plan update, provides a basis for identifying facility needs and recommendations for future airport development.

2.2 Physical Airport Setting

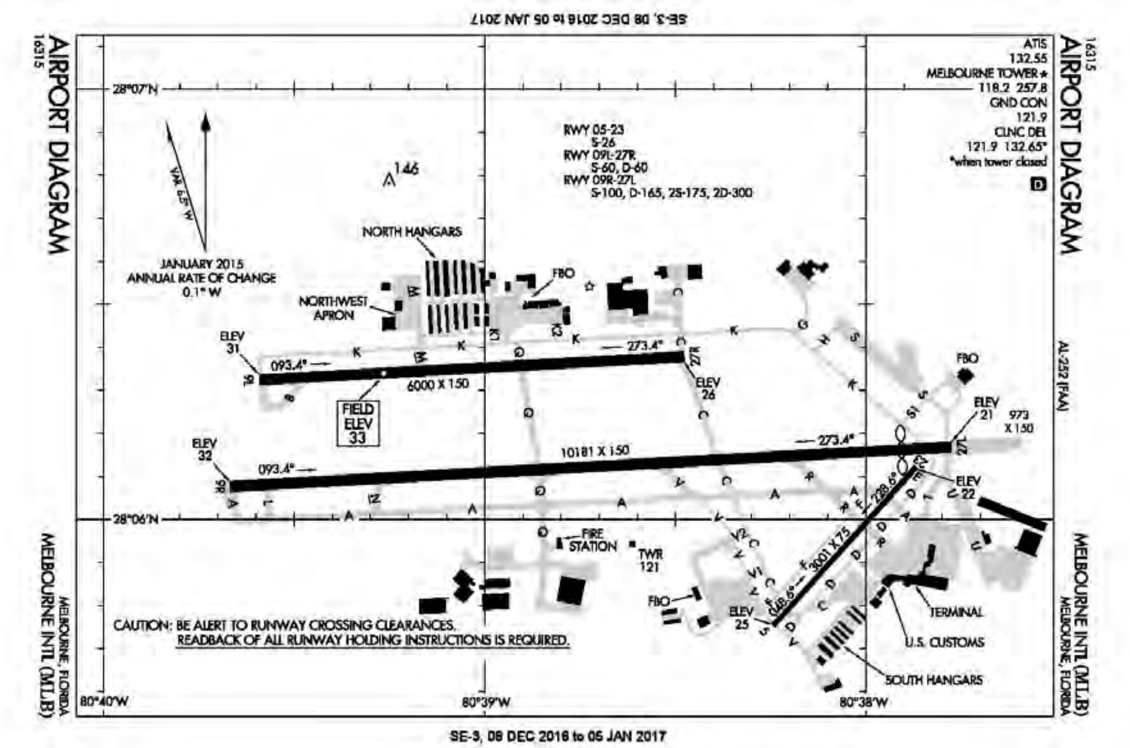
MLB's Federal Aviation Administration (FAA) airport diagram is depicted in **Figure 2-1** while **Figure 2-2** provides detail on the existing airport property and facilities. As illustrated in Figure 2-2, the airport is surrounded by dense residential, commercial, and industrial land uses. The airport is located approximately two miles east of Interstate 95 (I-95), one-mile south of Eau Gallie Boulevard, one-mile north of West New Haven Avenue (US Highway 192), and 0.6 mile west of the Indian River and Intracoastal Waterway. The airport is generally bounded by North Wickham Road to the west, a large residential subdivision to the north, Apollo Boulevard and a section of the Florida East Coast Railroad to the east, and NASA Boulevard to the south.

MLB's passenger terminal building, Federal Inspection Service (FIS), public parking lot, aircraft maintenance facilities, and air cargo building are located in the southeast sector of the airport. The Florida Institute of Technology's (FIT) aviation campus, the airport-owned commercial fuel farm, corporate hangars, large aviation and defense-related tenants (i.e., Harris Corporation, General Electric, and Northrop Grumman) are also located on the south side of the airfield. Atlantic Jet Center, aircraft maintenance facilities, aircraft storage hangars, and the Embraer Executive Jet campus and general aviation (GA) fuel farm are located on the north side of the airfield. Baer Air is located on the east side of the airfield.

Non-aviation related airport property located on the south side of the airport is leased and developed for a variety of uses, including technology companies (i.e., Rockwell Collins, Ricoh), Keiser University, East Florida State College, Kindred Hospital, Circle of Care (hospital), a Suburban Extended Stay Lodge, the Tropical Haven Mobile Park (retirement community), and several other businesses. Non-aviation property at the northeast corner of the airport contains the City of Melbourne's police headquarters, a shopping center, and rental storage units.

The present Airport Reference Point is Latitude 28° 06’ 09.91” N, Longitude 80° 38’ 42.94” W. The airfield has an elevation of 34.0 feet above mean sea level (AMSL). The airport property encompasses approximately 2,437 acres of land. Typical of a Florida coastal setting, terrain at the airport is generally level, with ground elevations that range approximately from 18 feet to 33 feet above AMSL. The airport and surrounding area contain a network of ditches and drainage canals.

Figure 2-1: Airport Diagram

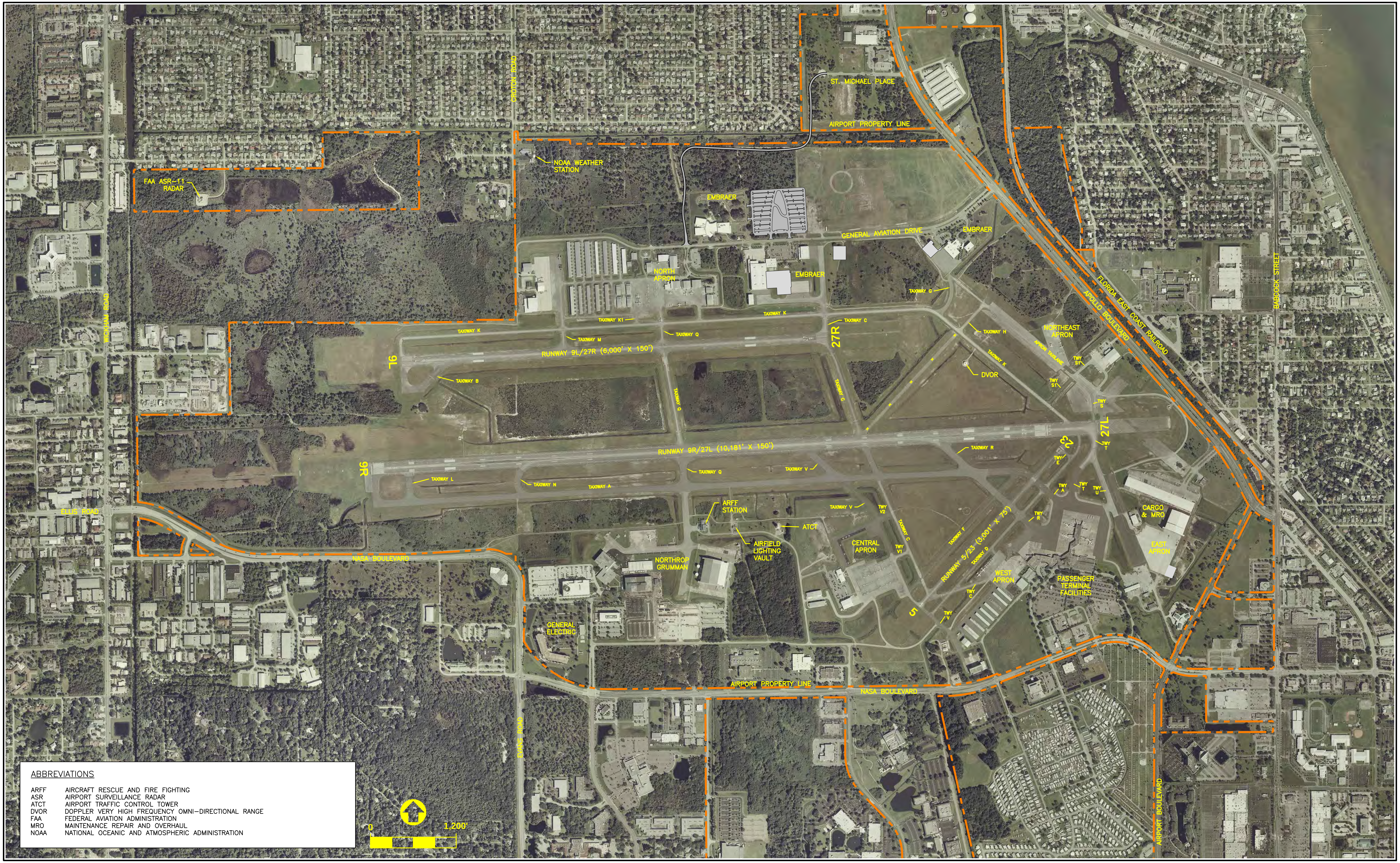


SOURCE: Federal Aviation Administration, 2015.

2.3 Airfield and Airside Facilities

2.3.1 Runways

As shown on Figure 2-1, MLB has three active runways. MLB’s two parallel runways, Runway 9R/27L and Runway 9L/27R, are oriented east-west and accommodate commercial aircraft and a wide range of GA aircraft. Runway 5/23, which is oriented in a northeast-southwest direction, accommodates small GA aircraft.



Source: ESA, 2016

FIGURE 2-2
EXISTING AIRFIELD FACILITIES

Runway design standards applicable to each runway at MLB are specified by a Runway Design Code (RDC). The RDC consists of three components related to the operational demands of aircraft anticipated to utilize the airport over the planning period. The first component is the Aircraft Approach Category (AAC), which is a grouping of aircraft having similar landing approach speed characteristics. The second component is the Airplane Design Group (ADG) that groups aircraft by wingspan and tail height. The third component relates to the visibility minimums expressed by Runway Visual Range (RVR) values in feet of 1200, 1600, 2400, 4000, and 5000 (corresponding to, lower than 1/4 mile, lower than 1/2 mile but not lower than 1/4 mile, lower than 3/4 mile but not lower than 1/2 mile, lower than 1 mile but not lower than 3/4 mile, and not lower than 1 mile, respectively).

TABLE 2-1
RUNWAY DESIGN CODE COMPONENTS

Aircraft Approach Categories		
Category	Approach Speeds	
A	Less the 91 Knots	
B	91 knots or more but less than 121 knots	
C	121 knots or more but less than 141 knots	
D	141 knots or more but less than 166 knots	
E	166 knots or more	
Airplane Design Group Categories		
Group	Tail Height (feet)	Wingspan (feet)
I	<20	<49
II	20 – 30	49 < 79
III	30 – 45	79 < 118
IV	45 – 60	118 < 171
V	60 – 66	171 < 214
VI	66 - <80	214 - <262
Runway Visual Range (RVR)		
5000	Not lower than 1 mile	
4000	Lower than 1 mile but not lower than ¾ mile	
2400	Lower than 3/4 mile but not lower than 1/2 mile	
1600	Lower than 1/2 mile but not lower than 1/4 mile	
1200	Lower than 1/4 mile	
VIS	Visual	

SOURCE: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*

2.3.1.1 Runway 9R/27L

Runway 9R/27L serves as the airport's primary runway and is 10,181 feet long and 150 feet wide. Runway 9R/27L is equipped with an Instrument Landing System (ILS). The grooved asphalt

runway has precision instrument markings and High-Intensity Runway Edge Lights (HIRL). The runway has the highest weight bearing capacity of all three runways at MLB. The current RDC for Runway 9R/27L is D-IV-2400. All three runways have compliant Runway Safety Areas (RSA) and both Runway 9L/27R and Runway 5/23 also have compliant Runway Object Free Areas (ROFA); however, there are a few vegetative obstructions to the ROFA for Runway 9R/27L. These are addressed in the facility assessment and requirements chapter. Information on this runway is summarized in **Table 2-2**.

The Runway 27L landing threshold is displaced 699 feet. **Table 2-3** lists the declared distances for Runway 9R/27L (the runway lengths available for takeoffs and landings).

TABLE 2-2
MLB RUNWAY INFORMATION SUMMARY

	Runway 9R/27L	Runway 9L/27R	Runway 5/23
Runway Length (feet)	10,181	6,000	3,001
Runway Width (feet)	150	150	75
Runway Marking	Precision	Non-Precision	Visual
Runway Design Code (current)	D-IV-2400	D-II-4000	A-I-VIS
Pavement Strength (pounds)			
Single	100,000	60,000	26,000
Dual	165,000	60,000	--
Dual Tandem	300,000		--
Pavement Surface	Asphalt - Grooved	Asphalt	Asphalt
Runway Lighting	High-Intensity Edge Lights, Centerline Lights, and Touchdown Zone Lights	Medium-Intensity Edge Lights	Medium-Intensity Edge Lights
Displaced Threshold (feet)	RW 27L - 699	None	None
Runway NAVAIDS	ILS, Localizer, and GPS (LPV)	GPS (LPV)	None
Runway Visual Approach Aids	MALSR, REIL, PAPI-4L	PAPI-4L	PAPI-2L
Area Weighted PCI (2012)	75	77	70

SOURCE: MLB Airport Layout Plan, 2014; FAA Digital Terminal Procedure Publications and Airport Diagram, 2014; and FAA Airport Facility Directory, March 5, 2015.

TABLE 2-3
RUNWAY 9R/27L DECLARED DISTANCES (FEET)

Runway End	Takeoff Run Available (TORA)	Takeoff Distance Available (TODA)	Accelerate Stop Distance Available (ASDA)	Landing Distance Available (LDA)
9R	10,181	10,181	10,181	10,181
27L	10,181	10,181	10,181	9,482

SOURCE: FAA Airport Facility Directory, March 5, 2015.

The Florida Department of Transportation (FDOT), as part of its Statewide Airfield Pavement Management Program, conducted an inspection of the Orlando Melbourne International Airport in January 2012. Runway 9R/27L, which was last overlaid in 1998, had pavement sections that ranged from Good to Fair condition. The keel section at the intersection with Taxiway N exhibited the most distress. Other sections of the runway exhibited typical pavement distresses associated with climate and age. The inspection and subsequent analysis determined an area weighted Pavement Condition Index[1] (PCI) of 75 for Runway 9R/27L, which is considered "Satisfactory." The PCI scores for this runway ranged from 69 to 86. The FDOT considers a PCI rating of 75 as the minimum service level for a runway. The inspection report did not identify an immediate need to conduct major maintenance and repairs. The Melbourne Airport Authority (MAA) proactively requested funding in the Joint Airport Capital Improvement Program (JACIP) to mill and overlay the existing Runway 9R/27L pavement (and possibly extend the runway) in fiscal year 2019 and 2020. It is expected that FDOT will re-inspect the airfield pavements in 2015.

2.3.1.2 Runway 9L/27R

Runway 9L/27R is 6,000 feet long and 150 feet wide. The asphalt runway is marked for non-precision instrument operations and is equipped with Medium-Intensity Runway Edge Lights (MIRL). The current RDC for Runway 9L/27R is D-II-4000. The runway meets applicable FAA design standards for the RSA and ROFA. Information on this runway is also summarized in Table 2-2.

The 2012 FDOT pavement inspection noted that the Runway 9L-27R keel section pavements were in mostly Fair condition. The outboard pavements were in Good condition and the runway exhibited typical pavement distresses associated with climate and age. The area weighted PCI rating for this runway was 77, which is considered Satisfactory. The PCI rating for this runway ranged from 69 to 100. The inspection report did not identify an immediate need to conduct major maintenance and repairs. However, the MAA has requested funding in the JACIP to mill and overlay the runway and the Taxiway B turnaround pavements in fiscal year 2015.

2.3.1.3 Runway 5/23

Runway 5/23 is 3,001 feet long and 75 feet wide. The asphalt runway has Basic runway marking for visual approaches. The runway is equipped with MIRLs. The current RDC for Runway 5/23 is A-I/VIS. The runway meets applicable FAA design standards for the RSA and ROFA. Information on this runway is also summarized in Table 2-2.

The 2012 FDOT pavement inspection noted that the Runway 5/23 pavements were in Fair to Satisfactory condition and the runway pavement exhibited typical pavement distresses associated with climate and age. The area weighted PCI rating for this runway was 70 (Fair), which is below

[1] The Pavement Condition Index (PCI) is a numerical index that is used to indicate the general condition of a pavement. The index score is based on a visual survey of the number and types of distresses in a pavement. The result of the analysis is a numerical value between 0 and 100, with 100 representing the best possible condition and 0 representing the worst possible condition.

the FDOT minimum service level for a runway. The PCI ratings for this runway ranged from 69 to 100. The inspection report identified the runway as having an immediate need for major maintenance and repair (mill and overlay).

2.3.2 Airport Reference Code

For the purposes of airfield and facility planning, the FAA has established a coding system called an Airport Reference Code (ARC). An airport's ARC reflects the airport's highest RDC (minus the visibility component). The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. MLB's ARC is D-IV.

2.3.3 Taxiways

Each of the three runways at MLB has a full-length parallel taxiway. The airfield is also developed with a network of connector and cross-field taxiways, which vary in width. With few exceptions, each taxiway is equipped with medium-intensity taxiway edge lights (MITL), and most of the fixtures have been upgraded to light-emitting diode (LED). **Table 2-4** lists each taxiway and provides summary information regarding use, pavement type, and pavement condition.

The 2012 FDOT pavement inspection determined that the overall taxiway system had an area weighted PCI rating of 92, which is considered Good. This reflects the MAA's implementation of a pavement management program that, over the last 10 years, rehabilitated and overlaid Taxiways K, Q, F, V, and portions of Taxiway A. The 2012 FDOT inspection identified several sections of taxiway pavement that had PCI ratings below the critical service level (65 PCI rating) and need immediate attention.

TABLE 2-4
MLB TAXIWAYS

Taxiway	Serves	Pavement Type	Width	Weighted PCI	PCI Range	Condition Rating	Immediate Action Required?
A	Parallel Taxiway - Runway 9R/27L	Asphalt	75' – 90'	100	100	Good	No
B	Turnaround taxiway - Runway 9L end	Asphalt	90'	92	92	Good	No
C	Cross-Field Taxiway – from Runway 27R to Runway 5/23 and South T-hangars	Asphalt	40' – 75'	85	65 – 100	Satisfactory	No
D	Parallel Taxiway - Runway 5/23	Asphalt	40'	77	57 – 100	Satisfactory	Yes
E	End Connector - Runway 5/23	Asphalt	40'	77	57 – 100	Satisfactory	Yes
F	Parallel Taxiway - Runway 5/23	Asphalt	25'	--	--	--	No

Taxiway	Serves	Pavement Type	Width	Weighted PCI	PCI Range	Condition Rating	Immediate Action Required?
G	Access Taxiway	Asphalt	50’	--	--	--	No
H	Connector Taxiway – K to S	Asphalt	40’	--	--	--	No
K	Parallel Taxiway - Runway 9L/27R	Asphalt	40’ – 50’	91	69 – 100	Good	No
L	Connector Taxiway - Runway 9R/27L	Asphalt	90’	93	71 – 100	Good	No
M	Connector Taxiway - Runway 9L/27R	Asphalt	75’	79	75 – 88	Satisfactory	No
N	Connector Taxiway - Runway 9R/27L	Asphalt	90’	94	78 – 100	Good	No
Q	Cross-Field Taxiway – from Runway 9L/27R and FBO area to Runway 9R/27L and Northrop Grumman facilities	Asphalt	40’ – 90’	93	69 – 100	Good	No
R	Connector Taxiway - Runway 9R/27L and Passenger Terminal Building	Asphalt	90’	97	63 – 100	Good	Yes
S	Access Taxiway – FBO to Runway 9R/27L	Asphalt	35’	--	--	--	No
T	Connector Taxiway - Runway 9R/27L to Passenger Terminal	Asphalt	90’	88	83 – 94	Good	No
U	Taxiway to Passenger Terminal and East Apron	Asphalt	75’	86	42-95	Good	No
V	Connector Taxiway – Runway 5 end	Asphalt	25’ – 90’	100	100	Good	No

NOTES:
1) “--“ indicates the taxiway was not evaluated in the 2012 FDOT pavement study.
2) Taxiway F was constructed after the 2012 FDOT inspection, but is included for reference purposes.

SOURCE: FDOT Statewide Airfield Pavement Management Study – April 2012.

2.3.4 Aircraft Parking Aprons

The airport has numerous aircraft parking aprons, ranging from large public-use aircraft parking aprons to small, individual aprons at private hangars. This section will provide an overview of public-use aprons, Fixed Base Operator (FBO) aprons, and maintenance, repair, and overhaul (MRO) operators at MLB. The locations of the aprons are depicted on Figure 2-2.

Passenger Terminal Apron – The apron serving the passenger terminal building includes approximately 40,000 square yards of Portland Cement Concrete (PCC) marked for six aircraft parking positions. The surrounding asphalt apron edge taxilanes provide another 45,000 square yards. Combined this apron has PCI ratings from 79 to 91 with an area weighted PCI rating of 85, which is satisfactory.

Central Apron – The aircraft parking apron at the FIT Aviation campus provides parking for flight instruction aircraft and the public utilizing FIT's FBO services. The tie-down apron is approximately 24,000 square yards in size and has taxilanes adjoining all four sides of the apron. There are approximately 56 tie-down parking spaces. The apron at the adjacent maintenance hangar is approximately 910 square yards in size. The apron has a PCC surface that is in Satisfactory condition with an area weighted PCI rating of 74.

East Apron – The East Apron, which is approximately 10,000 square yards in size (excluding Taxiway U), was comprised of asphalt sections and sections constructed of asphalt overlaid on PCC. In 2012, the FDOT determined that the apron was in Fair condition, with PCI rating that ranged from 42 to 95 and an area weighted PCI rating of 58. The East Apron and adjoining Taxiway U are adjacent to an aircraft parking apron that is approximately 25,750 square yards in size. In 2014, a portion of Taxiway U, the East Apron, and adjoining apron were rehabilitated (asphalt sections) and reconstructed (PCC sections) in support of the movement and parking of large commercial aircraft (i.e., Boeing 747s) at the newer MRO hangar and cargo aircraft using the air cargo building.

West Apron – The West Apron is associated with FIT's former site and is located immediately southwest of the passenger terminal building. The site has approximately 28,000 square yards of aircraft tie-down space and 5,700 square yards of apron. The hangar and buildings are presently being redeveloped for instructional aircraft maintenance programs by the Eastern Florida State College. The apron has a PCC surface which has PCI ratings that range from 0 to 100. Overall, the apron has a Poor rating with an area weighted PCI rating of 52. The FDOT pavement management study recommended reconstruction of the apron.

North Apron – The North Apron is located on the north side of Runway 9L/27R. The area can generally be divided into areas that are used for FBO, aircraft maintenance and large aircraft storage and an area used predominantly for aircraft tie-downs. Approximately 15,500 square yards of apron are associated with FBO services (parking for transient aircraft), handling and parking aircraft in for maintenance, and large corporate hangars. The apron primarily used for aircraft tie-down is approximately 23,200 square yards in size and has approximately 40 small aircraft tie-down positions. The asphalt surface is in satisfactory condition, with an area weighted PCI rating of 80.

Northeast Apron – Baer Air, an FBO, operates an aircraft parking apron that is approximately 5,000 square yards in size, exclusive of taxilanes. This apron is used for aircraft parking (transient and based) and aircraft handling. Until such time that an additional apron is constructed, the FBO utilizes adjoining remnant pavements for aircraft parking. The apron pavement, constructed in late 2008/early 2009, was not evaluated by the FDOT in 2012.

2.3.5 Approach Lighting and Visual Approach Aids

2.3.5.1 Approach Lighting System

Runway 9R/27L is equipped with an ILS. Precision instrument approaches to Runway 9R are supported by a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). The MALSR is comprised of a combination of threshold lights, light bars, and sequenced flashing lights that provide visual information to pilots on runway alignment, height perception, roll guidance, and horizontal references for Category I precision approaches.

2.3.5.2 Runway End Identifier Lights (REIL)

Runway 27L is equipped with a REIL system, which assists pilots with the identification runway ends in urban areas at night and during periods of reduced visibility. The REIL consist of two synchronized, unidirectional flashing lights located at each corner of the Runway 27L landing threshold.

2.3.5.3 Precision Approach Path Indicator (PAPI)

PAPIs provide visual guidance and safe obstruction clearance to pilots during an approach and landing. A series of white and red lights indicate whether a pilot is below, on, or above the desired glide path to the Touch Down Zone (TDZ) at each end of the runway. Both ends of Runway 9R/27L and Runway 9L/27R are equipped with PAPI-4 systems. Both ends of Runway 5/23 are equipped with a PAPI-2 system.

2.3.5.4 Rotating Beacon

An airport beacon emits alternating white and green flashes of light and identifies the location of MLB from a distance at night. The pole-mounted rotating beacon is located on the north side of the airfield, approximately 400 feet south of General Aviation Drive. The beacon was replaced in 2009. The old beacon continues to flash its white and green lights in the airport museum within the MLB main terminal building.

2.3.6 General Aviation FBO Facilities

There are presently three Fixed Base Operators at MLB. The FBOs provide terminal facilities for general aviation passengers and pilots and provide a variety of services that include, but are not limited to, flight planning, aircraft fuel and counter sales, parking and storage, flight training, maintenance, and ground transportation.

Atlantic Jet Center, located on the north side of the airfield, has served MLB's general aviation community since 1998. Atlantic Jet Center is a full-service FBO.

Baer Air, located on the east side of the airfield along South Apollo Avenue, provides FBO services, leases aircraft storage space in its hangar, operates as a 14 CFR Part 135 carrier and provides scheduled flights to destinations such as the Bahamas. Baer Air is a full-service FBO.

FIT Aviation is the primary flight school at MLB and provides training to flight students attending the FIT College of Aeronautics as well as other flight training programs. FIT Aviation also provides full-service FBO services to the public.

2.3.7 Public Aircraft Storage Hangars

The airport has numerous hangars that range widely in size and have different uses. Many of the individual hangars, and community space within some large hangars, are available for rent by the public for aircraft storage. Other hangars are occupied by the hangar owner or leased to aviation-

related businesses. This section provides an overview that focuses on those hangars that are available for rent to the public for aircraft storage. A summary of the public hangar space is provided in **Table 2-5**.

Southside Hangars – Six T-hangar buildings are located southwest of the passenger terminal area. These eight unit buildings, which are owned and rented by the MAA, provide a total of 48 storage units for small aircraft. The six buildings are in fair condition and the MAA has taken measures (e.g., roof coating) to enhance their utility and longevity. An eight unit, large aircraft T-hangar building at this location was demolished in 2014 due to age and physical deterioration.

Northside Hangars – There are several aircraft storage hangars on the north side of the airfield that are owned by private entities (on leased airport land) and rented to the public. These include nine T-hangar buildings that provide between nine and 21 units each, three front-loading box hangar buildings, and four executive hangars.

TABLE 2-5
SUMMARY OF PUBLIC AIRCRAFT STORAGE HANGAR SPACE

Building Type	Number of Buildings	Total Number of Units
Southside Hangars		
T-Hangar	6	48
Northside Hangars		
T-Hangar	9	135
Box Hangar	3	26
Executive Hangar	4	12
Total	**22**	**221**

SOURCE: Orlando Melbourne International Airport; ESA, 2015.

In addition to public aircraft storage discussed above, MLB has several large corporate, FBO, and multi-use hangars on the airport that store a wide variety of GA aircraft, including corporate jets. In some cases, these privately-owned hangars provide storage space for multiple aircraft owners.

2.3.8 Air Cargo Facilities

A building was constructed on the east side of the airfield in 1995 to accommodate air cargo. The building is approximately 123,000 square feet in size and is located within a Free Trade Zone. Due to reduced cargo volumes handled at the airport and the effects of the economic recession, portions of the building are presently used for other aviation-related activities, including aircraft manufacturing (e.g., Discovery Aviation).

2.3.9 Military Aviation Facilities

Northrop Grumman Aerospace Systems, located on the south side of the airport, creates and provides systems for agencies such as the Department of Defense and other security agencies. Since 2000, Northrop Grumman has provided sustainment services for the Joint Surveillance Target Attack Radar System (STARS) fleet and therefore, the larger US Air Force E-8C sometimes seen at MLB. In addition, transient military aircraft commonly use FBO facilities at MLB for refueling.

2.3.10 Air Traffic Control

Air traffic at MLB is currently managed by FAA-contracted air traffic controllers from 6:00 a.m. to 12:00 a.m., daily. The airport traffic control tower (ATCT), constructed in 1966, is staffed and operated by a private company. The ATCT is located on the south side of Runway 9R/27L between Taxiway Q and Taxiway V. When the ATCT is not in operation, radar approach control is handled by the Orlando Terminal Radar Approach Control Facility (TRACON). Uncontrolled areas on the MLB airfield include Taxiway V southeast of Taxiway D, Taxiway C north of Taxiway K, Taxiway Q south of Taxiway A and Taxiways U, H, and G.

Past Master Plan studies at MLB noted that the tower structure has exceeded its useful life and does not meet increased FAA requirements for line-of-sight. The existing ATCT also does not provide adequate and modern space to efficiently meet the needs of air traffic controllers and associated equipment. The Melbourne Airport Authority is presently conducting an ATCT siting study that will identify a site for the future construction of a new ATCT.

2.3.11 Aircraft Rescue and Fire Fighting

Commercial service airports, such as MLB, must provide aircraft rescue and firefighting (ARFF) services during air carrier operations. The MAA operates a dedicated ARFF facility at the airport. The ARFF facility meets FAA requirements for Index C, which is appropriate for the commercial aircraft operating at MLB, and has the immediate capability to operate as Index D. To meet Department of Defense ARFF requirements, Northrop Grumman operates a separate, supplemental ARFF facility on its property.

2.4 Airspace, Navigational Aids, and Instrument Approach Procedures

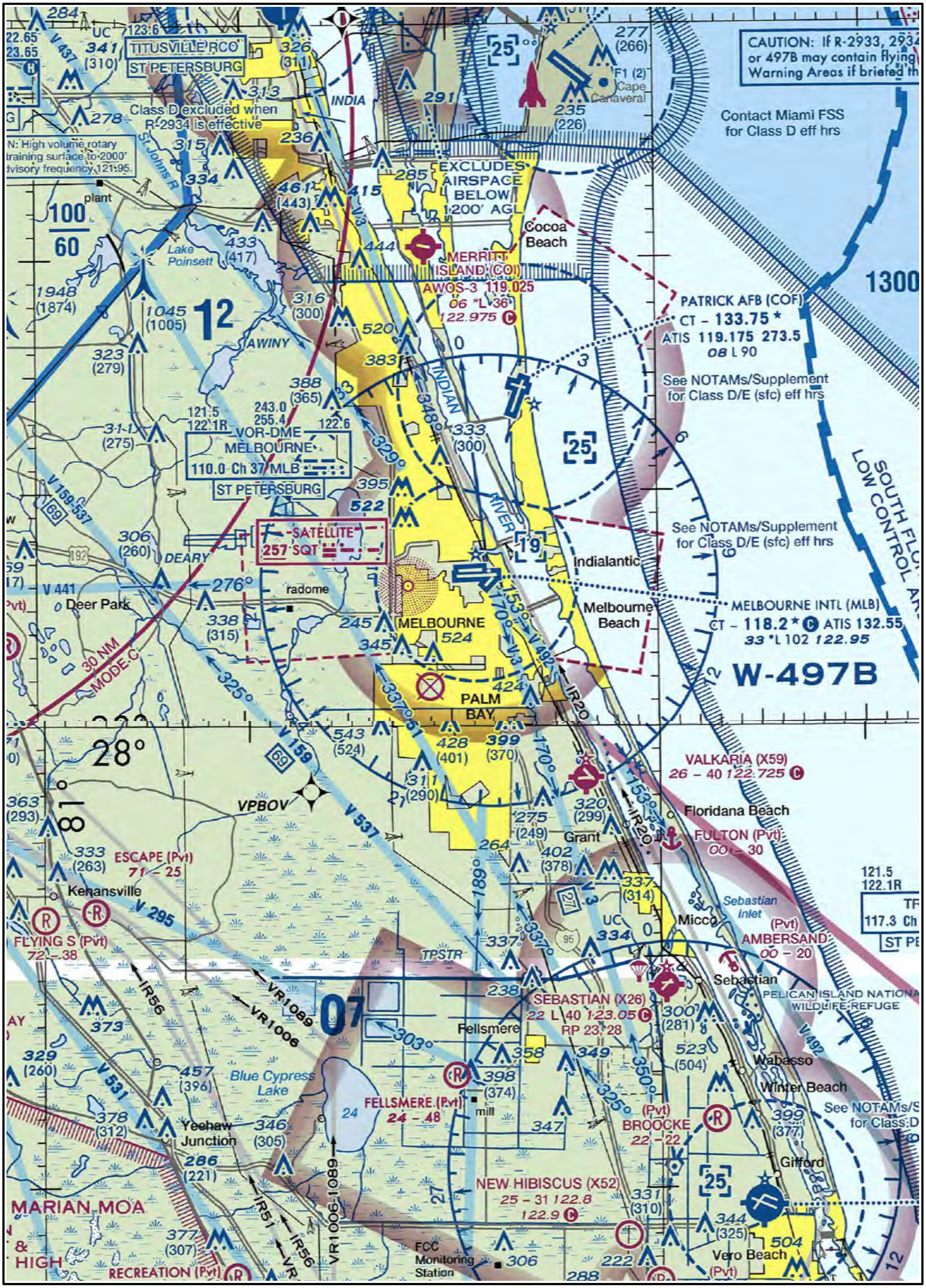
2.4.1 MLB Airspace

The FAA has six classifications of airspace under the National Airspace System (NAS). These classifications, designated Class A, B, C, D, E, and G, are critical to the safety of all flights and to the efficient operation of all air traffic control facilities. Based on the level of activity and type of operations, airports receive a classification of B, C, D, E, or uncontrolled airspace. Class A airspace exists above 18,000 feet AMSL and Class G is classified as uncontrolled airspace.

Because MLB has an active ATCT, the airspace immediately surrounding the airport is classified as Class D airspace as shown in **Figure 2-3**. MLB's Class D airspace does not follow the standard Class D profile. Instead of designating airspace from the surface to 2,500 feet above airport elevation, as is typical, MLB's Class D airspace extends up to 1,900 feet above the airport elevation. In addition, the Class D airspace has a radius of approximately five nautical miles except to the north/northeast where the MLB Class D airspace abuts the Patrick Air Force Base (COF) Class D airspace. Aircraft operating under both visual and instrument flight rules (VFR and IFR, respectively) are permitted into the MLB Class D airspace; however, each aircraft must have two-way radio communication with MLB ATCT prior to entering. Aircraft operating in the MLB Class D airspace (below 1,900 feet AGL and within 4 nautical miles of the primary airport) are not allowed to exceed 200 knots indicated airspeed (230 mph), and separation services are not generally provided to VFR aircraft. When the tower closes, the Airport becomes a Class G airfield with pilots utilizing the tower frequency as a common traffic advisory frequency to state their intentions.

To the east and west of the MLB Class D airspace is Class E airspace, designated by magenta dashed lines on Figure 2-3, that designate controlled airspace to the surface. This airspace, which is controlled by the Orlando TRACON, is designated to contain the instrument approaches to MLB.

Overall, the region has complex airspace that includes controlled airspace associated with airports along the east coast of Florida (e.g., the Daytona Beach International, Space Coast Regional, Vero Beach Regional, and St. Lucie County International Airports) and inland airports, such as the Orlando International and Orlando-Sanford International Airports. In addition, nearby Patrick Air Force Base, as well as the Cape Canaveral Air Force Station and NASA Shuttle Landing Facility have designated airspace.



Source: Federal Aviation Administration, 2016.

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FIGURE 2-3

ORLANDO MELBOURNE INTERNATIONAL AIRSPACE

2.4.2 Special Use Airspace

Special use airspace associated with the Kennedy Space Center and Cape Canaveral is located to the north and east of MLB. This airspace contains areas that are restricted either continuously or intermittently. In addition, a large area over Cape Canaveral and the adjoining Atlantic Ocean (shaded dark blue on Figure 2-3), is subject to flight limitations under 14 Code of Federal Regulations (CFR) Part 91.143, which limits flights in proximity to space flight operations. When a Notice to Airmen (NOTAM) is issued under the provisions of Part 91.143, no person may operate an aircraft within areas designated in the NOTAM, except when authorized by air traffic controllers. The special use airspace in the vicinity of MLB is summarized in **Table 2-6**.

TABLE 2-6
SPECIAL USE AIRSPACE IN VICINITY OF MLB

Area Designation	Altitude (feet above mean sea level)	Time of Use
Restricted Area R-2932	Surface up to, but not including, 5,000 feet	Continuous
Restricted Area R-2933	5,000 feet to Unlimited	Intermittent. NOTAM normally issued 24 hours in advance
Restricted Area R-2934	Unlimited	Intermittent. NOTAM normally issued 24 hours in advance
Restricted Area R-2935	11,000 to Unlimited	Intermittent. NOTAM normally issued 24 hours in advance
Warning Area		
W-136F	Unlimited	Continuous
W-137F	Unlimited	Continuous
W-137G	To 13,000	Continuous
W-138E	Unlimited	Continuous
W-497A	Unlimited	Continuous
W-497B	Unlimited	By NOTAM

SOURCE: *Tampa/Orlando VFR Terminal Area Chart*. Federal Aviation Administration, February 2015.

2.4.3 Surrounding Airports

Several NPIAS and non-NPIAS airports are located in the vicinity of MLB. The nearest facility is Patrick Air Force Base, approximately 10 miles north-northeast of MLB. Airports in the vicinity of MLB are listed in **Table 2-7** and depicted on **Figure 2-4**.

TABLE 2-7
PUBLIC-USE AIRPORTS IN THE VICINITY OF MLB

Airport	Distance/Direction
Patrick AFB	10.0 nm/NNE
Merritt Island Airport	14.5 nm/N
Space Coast Regional	25.8 nm/NNW
Orlando International	40.2 nm/NW
Valkaria	9.5 nm/SSE
Sebastian Municipal	18.6 nm/SSE

SOURCE: *Tampa/Orlando VFR Terminal Area Chart*. Federal Aviation Administration, February 2015.

2.4.4 MLB Navigational Aids

MLB employs several navigating aids, airport lighting, and airport markings to help pilots safely navigate to and land at the airport. Navigational aids (NAVAIDS) include: an ILS, Area Navigation (RNAV)/Global Positioning System (GPS), and a Doppler Very High Frequency-Omni Directional Range (VOR) with Distance Measuring Equipment (DME), or VOR/DME.

2.4.4.1 Instrument Landing System

An ILS is an electronic system which provides precision lateral and vertical guidance during the approach and landing phases of a flight. An ILS is comprised of a localizer antenna, which provides lateral course guidance to the runway, and a glideslope antenna, which provides vertical course guidance. Presently, a precision ILS approach and non-precision localizer approach are provided to Runway 9R. The opposite end of the runway (Runway 27L) is able to utilize the ILS's localizer for a non-precision "back course" approach.

2.4.4.2 GPS Approaches

The GPS uses a network of satellites to create reference points that enable users, including aircraft pilots, equipped with GPS receivers to determine their latitude, longitude, and altitude. Area Navigation or RNAV is a method of navigation that permits aircraft operation on any desired flight path using the combination of both GPS and ground based navigational aids. RNAV routes and terminal procedures, including departure procedures and standard terminal arrivals, are designed with RNAV systems in mind to save on time and fuel, reduce aircraft dependence on air traffic

control (ATC) vectoring, and provide for more efficient use of airspace. The availability of Wide Area Augmentation System (WAAS) enables the following approaches at MLB:

- **Localizer Performance with Vertical Guidance (LPV)** approaches – take advantage of the refined accuracy of WAAS lateral and vertical guidance to provide an approach very similar to a Category I ILS.
- **Lateral Navigation/Vertical Navigation (LNAV/VNAV)** –provide both horizontal and approved vertical approach guidance.
- **Lateral Navigation (LNAV)** – non-precision approaches that provide lateral guidance.

2.4.4.3 VOR/DME

A VOR/DME facility provides two individual services: VOR azimuth, and a distance component. This navigational aid works for properly equipped aircraft by using a very high frequency (VHF) radio to project straight line courses (radials) from the station in all directions of which pilots can navigate these radials to and from the VOR/DME station. As mentioned above, the VOR/DME also has a distance capability or distance measuring equipment that lets the pilot know their slant range distance from the station.

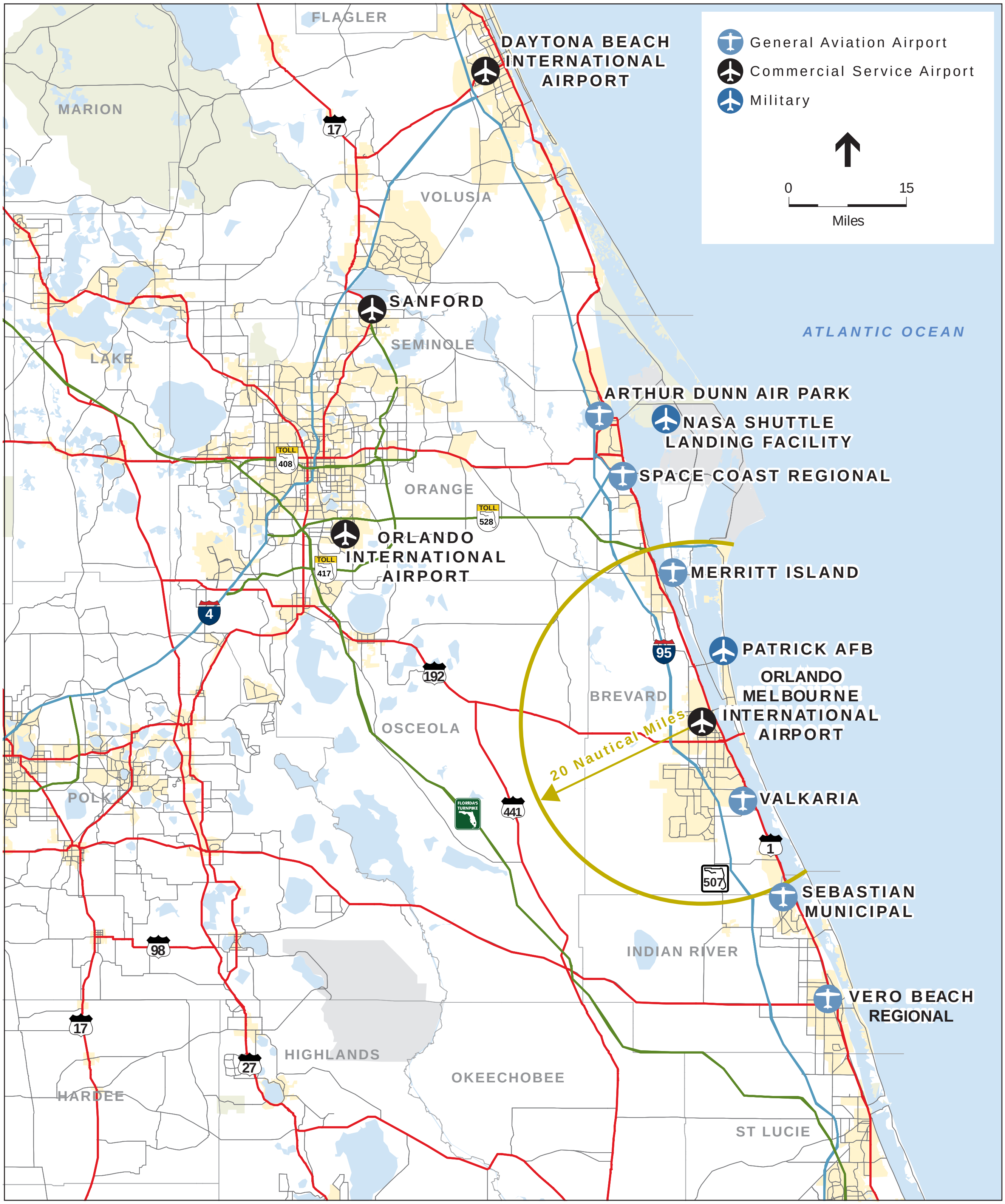
Until recently, MLB's VOR/DME was located approximately 1,500 feet northwest of the arrival end of Runway 27L. The VOR/DME was recently shut down for demolition and replacement. The former VOR/DME was a Class L VOR/DME, which has a standard service volume limit of 40 nautical miles from 1,000 feet above ground level (AGL) to 18,000 feet AGL. The FAA's Airport Facility Directory noted that the VOR was unusable for air navigation in certain areas: between 330 and 339 degrees; between 80 and 120 degrees beyond 10 nautical miles, below 2,000 feet; and between 281 and 324 degrees beyond eight nautical miles, below 4,000 feet. The DME was unusable between 330 and 339 degrees, beyond 33 nautical miles. The MAA is currently in the process of replacing the VOR/DME with a Doppler VOR/DME (DVOR/DME). The DVOR/DME is the second generation equipment that will provide improved signal quality and accuracy.

2.4.5 MLB Standard Terminal Arrival and Departure Procedures

Standard Terminal Arrival Routes (STARs) and Departure Procedures (DPs) simplify and expedite IFR air traffic controller arrival and departure procedures. STARs and DPs commonly serve more than one airport in an area.

2.4.5.1 MLB Standard Terminal Arrival Routes

Two STARs serve the Orlando area. The COSTR THREE Arrival (RNAV) IFR route brings eastbound and northbound aircraft to an intersection located near Winter Haven, Florida, where they can be vectored eastward to MLB. The BITHO SEVEN arrival route brings southbound aircraft to an intersection located approximately 30 nautical miles north-northwest of MLB, where they can be vectored to MLB.



SOURCE: DeLorme Street Atlas USA, 2000; ESA, 2016

FIGURE 2-4
SURROUNDING AIRPORTS

2.4.5.2 MLB Departure Procedures

A DP is an ATC procedure for departing aircraft that has been established at certain airports to simplify clearance delivery procedures. DPs also assist pilots conducting IFR flights in avoiding obstacles during climb out to Minimum Enroute Altitude (MEA) and can help to minimize impacts to noise sensitive areas.

MLB has one published DP, the MELBOURNE FOUR DEPARTURE. The DP provides takeoff obstacle notes for all three runways and departure route descriptions for Runway 9R/27L. Runway 9R takeoffs climb on VOR radial 096 for 5.2 nautical miles, then turn left heading 360 degrees. Runway 27L takeoffs climb heading 274 degrees. Departing aircraft can expect radar vectors from ATC to join their assigned routes and filed flight altitudes ten minutes after departure.

2.4.6 MLB Instrument Approach Procedures

The FAA currently publishes VOR, GPS, and ILS Instrument Approach Procedures (IAPs) for MLB. These approaches, and their lowest associated minimum descent altitudes and minimum runway visual range, are summarized in **Table 2-8**.

TABLE 2-8
MLB INSTRUMENT APPROACH PROCEDURES AND MINIMUMS

Instrument Approach Procedure		Aircraft Category			
		A	B	C	D
VOR RWY 9R (JEMDO Fix Minimums)	Straight-in 9R	440/24	440/24	440/40	440/40
	Circling	500/1	520/1	520/1 1/2	620/2
RNAV (GPS) RWY 9R	LPV DA	232/24	232/24	232/24	232/24
	LNAV/VNAV DA	427/40	427/40	427/40	427/40
	LNAV MDA	400/24	400/24	400/35	400/35
	Circling	500/1	520/1	520/1 1/2	620/2
ILS or LOC RWY 9R	Straight-in ILS 9R	232/18	232/18	232/18	232/18
	Straight-in LOC 9R	380/24	380/24	380/30	380/30
	Circling	500/1	520/1	520/ 1 1/2	620/2
RNAV (GPS) RWY 9L	LPV DA	283/ 3/4	283/ 3/4	283/ 3/4	283/ 3/4
	LNAV/VNAV DA	467/1 3/8	467/1 3/8	467/1 3/8	467/1 3/8
	LNAV MDA	420/1	420/1	420/1 1/8	420/1 1/8
	Circling	500/1	520/1	520/1 1/2	620/2
LOC BC RWY 27L	S-27L	500/1	500/1	500/1 3/8	500/ 1 3/8
	Circling	500/1	520/1	520/1 1/2	620/2
RNAV (GPS) RWY 27L	LPV DA	226/ 3/4	226/ 3/4	226/ 3/4	226/ 3/4
	LNAV/VNAV DA	318/ 7/8	318/ 7/8	318/ 7/8	318/ 7/8
	LNAV MDA	500/1	500/1	500/1 3/8	500/1 3/8
	Circling	500/1	520/1	520/1 1/2	620/2

Instrument Approach Procedure		Aircraft Category A	B	C	D
RNAV (GPS) RWY 27R	LPV DA	232/ 3/4	232/ 3/4	232/ 3/4	232/ 3/4
	LNAV/VNAV DA	443/1 3/8	443/1 3/8	443/1 3/8	443/1 3/8
	LNAV MDA	400/1	400/1	400/1	400/1
	Circling	500/1	520/1	520/ 1 1/2	620/2

SOURCE: U.S. Terminal Procedures Publication

2.4.7 VFR Aircraft Operations

MLB's operational environment is Class D airspace where aircraft are required to have two-way radio communication with the ATCT prior to entering the airspace. Aircraft operating under VFR procedures, while in contact with the ATCT, are responsible for seeing and avoiding other aircraft, as well as their own navigation unless otherwise directed by the ATCT. Itinerant aircraft, those aircraft originating from a different airport, must contact MLB ATCT at least five nautical miles from the airport prior to entering the airspace. MLB ATCT will then give the aircraft instructions and expected runway for landing depending on the aircraft's arrival direction of flight and/or parking on the airport. Itinerant aircraft departing MLB contact ground control prior to taxiing and note their direction of flight for which the ATCT will clear them.

2.4.8 Flight Training Operations

FIT Aviation, the primary flight school at MLB, trains student pilots from around the world. The school conducts both VFR and IFR flight training in small general aviation aircraft. Historically, much of the flight training conducted at MLB occurs on a block time basis and includes waves of takeoffs and landings that occur around the same time. During periods with reduced training levels, the number of take-offs and landings can be spread out more evenly over mornings and afternoon training periods. The MLB ATCT has set up procedures that promote the safe and efficient use of the airport and airspace by having specific local training patterns. MLB has specific training patterns, depending if the airport is in either an east or west flow condition. Most of the local flight training is conducted using Runway 9L/27R and Runway 5/23. Touch and go operations are restricted at MLB after 9:00 p.m. or two hours after sunset, whichever is later.

2.5 Terminal and Landside Facilities

2.5.1 Passenger Terminal Building

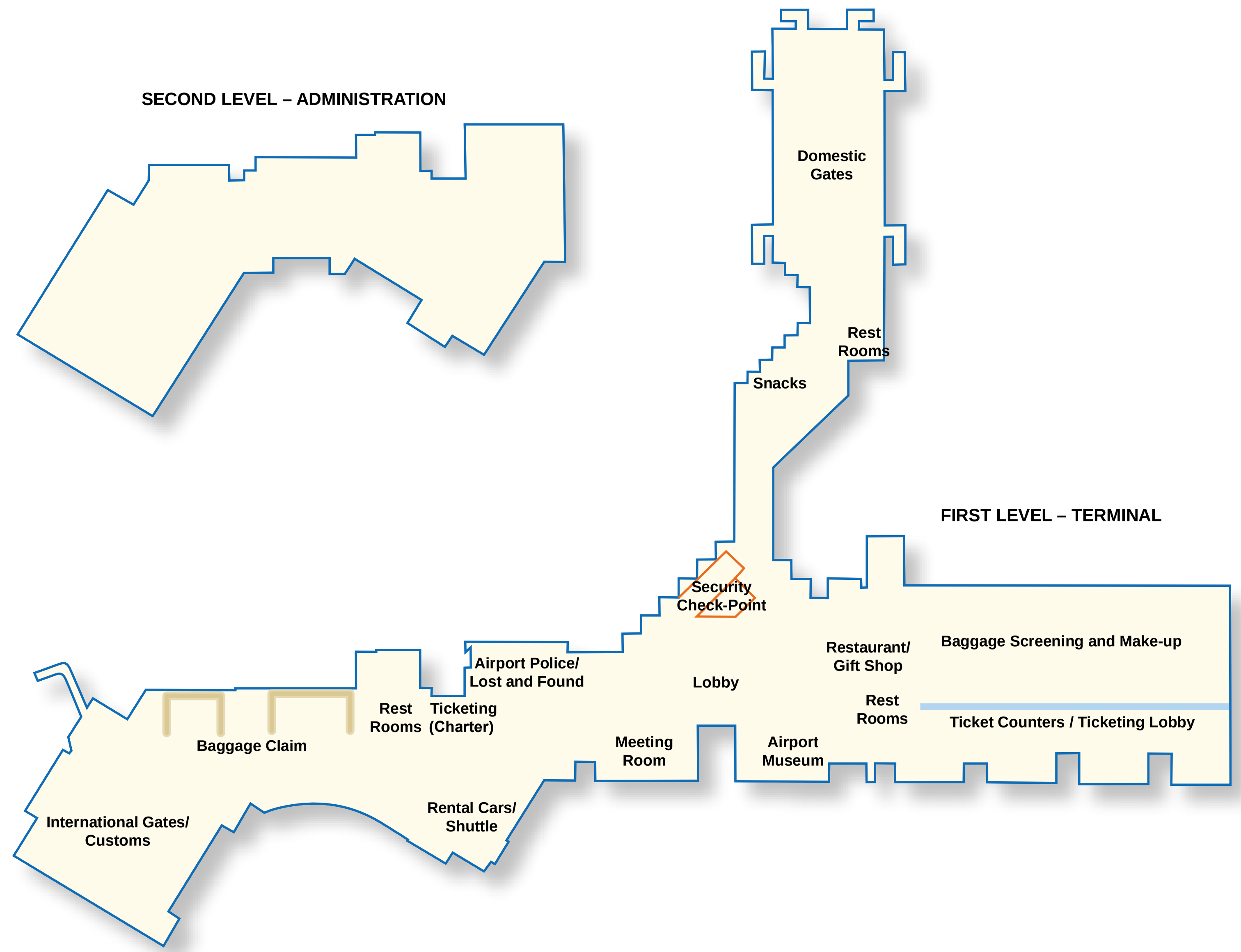
Orlando Melbourne International Airport's passenger terminal building, constructed in 1988-1989, is predominantly a single-level terminal building with passenger ticketing and baggage claim on the same level. The building's "pier" layout reflects the linear shape of the main terminal and the perpendicular concourse

extension for arrival and departure gates. The layout of the terminal building and its major features are depicted in **Figure 2-5**.

In addition to ticketing and baggage claim functions, MLB's terminal building contains space for enplaning baggage screening and make-up, MLB Police, Transportation Security Administration (TSA) passenger screening, atrium/lobby, ground transportation services, a restaurant and gift shop, an airport museum, meeting space (Florida Room), and restrooms. An elevated domestic concourse provides secure-side concessions, and restrooms. The concourse has six departure lounges each equipped with boarding bridges capable of servicing ranging in size from regional jets to wide-body jets. The departure lounges are used by Delta Air Lines, American Airlines, Elite Airways, and Baer Air (charter). Amenities in the passenger terminal building include free Wi-Fi, an ATM, and information displays highlighting the aerospace and aviation companies in Melbourne and the airport's rich aviation history.

A two-level International Terminal is located on the west end of the main passenger terminal building. The International Terminal has one international gate on the second level that is equipped with a boarding bridge capable of servicing wide-body jets. The main level has baggage claim and passenger screening. The International Terminal also provides space for US Customs and Border Protection staff and Federal Inspection Services.

The passenger terminal building contains approximately 193,574 square feet of usable space. The space allocation is summarized in **Table 2-9**. The MAA's *Terminal Transformation Master Plan*, which was prepared concurrently with this Master Plan update, provides a detailed description of the terminal and its space allocations (see **Appendix B**).



SOURCE: Melbourne Airport Authority, 2016

FIGURE 2-5
TERMINAL DIAGRAM

TABLE 2-9
MLB PASSENGER TERMINAL BUILDING SPACE ALLOCATION

Area	Size (square feet)
Airline Space Ticketing, Office, Baggage Make-up, Airline Operations, Baggage Claim, Departure Lounges, and International Terminal	91,765
Ground Transportation Rental Car, Taxi, Shuttle, Bus Service	2,460
Concessions Food and Beverage, News and Merchandising	8,574
Public Space Ticket Lobby, Baggage Claim, Concourse, Corridors, Restrooms, Airport Museum, Meeting Room, and Circulation	42,318
Security Screening	11,669
Airport Administration Administration Offices, Airport Police, Mechanical Rooms and Building Maintenance, Meeting Rooms, and Other Offices	36,788
Total	193,574

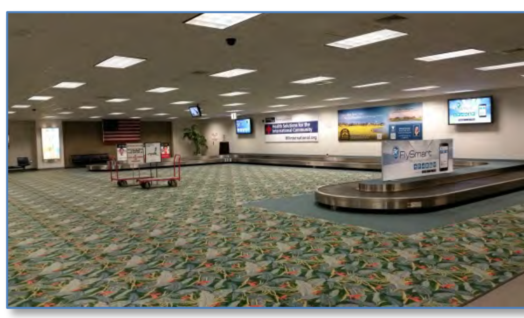
SOURCE: MAA, 2015.

2.5.2 Terminal Concessions

A deli-style restaurant and bar serving beer, wine, and liquor are located adjacent to the atrium/lobby and are open daily. A gift shop is also located in the lobby, adjacent to the restaurant. A café/bar is located in the concourse, near the security checkpoint.

2.5.3 Baggage

Baggage checked at the ticketing counters moves to a screening room via belt conveyors, where it is fed to the screening area via a roller conveyor. MLB has one baggage screening machine, but can accommodate a second machine. After screening, the baggage moves to a crescent-plate conveyor for baggage make-up and transport to appropriate planes.



For arriving domestic passengers, the baggage claim area is located on the main level at the west end of the terminal, near ground transportation services. The baggage claim area currently has one crescent-plate conveyor baggage claim system. A baggage claim belt is also located on the main level in the International Terminal.

2.5.4 Rental Cars and Ground Transportation

On-airport car rental agencies with counter space in the terminal include: Avis, Budget, Enterprise, Hertz, National/Alamo, and Thrifty. MLB has on-airport car cleaning facilities that are available to the car rental companies. The car cleaning facilities are in fair condition.

Ground transportation is also provided by Melbourne Airport Express (door-to-door shuttle service), Space Coast Area Transit (public mass transit bus service), Greyhound bus line, taxi services, limousine service, and hotel courtesy vehicles.

2.5.5 Ground Access and Terminal Parking

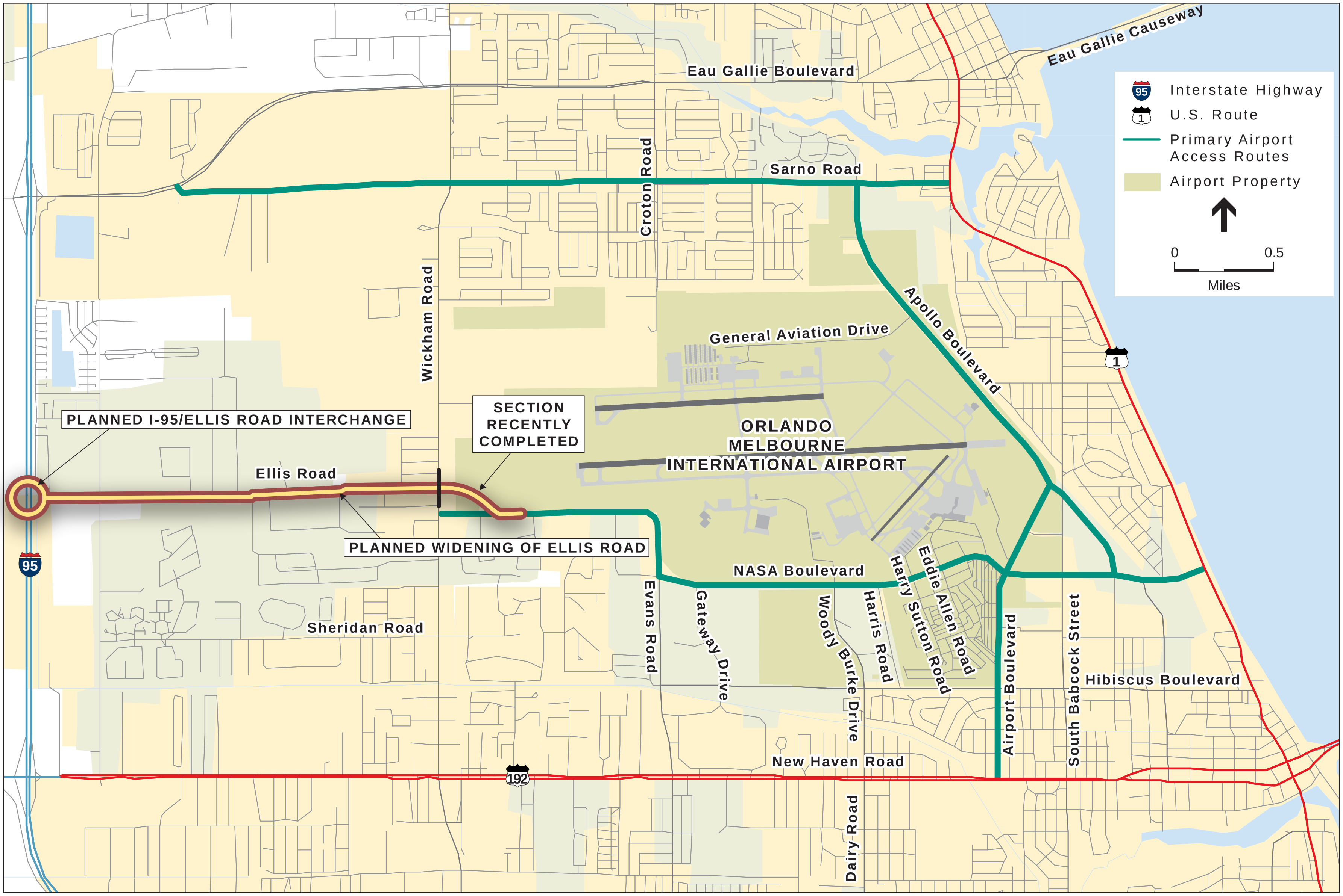
2.5.5.1 Access from Major Highways

The MLB terminal, located at One Air Terminal Parkway, is less than five miles from I-95 (see **Figure 2-6**). However, access to MLB from I-95, other federal highways, and state routes involve driving through urbanized areas on roads that have numerous traffic signals and driveways. Access to MLB from major highways is summarized below:

- **From I-95 via Eau Gallie Boulevard**: Take I-95/Eau Gallie Blvd exit east to John Rhodes Boulevard (0.3 mile), John Rhodes Boulevard south to Ellis Road (1.5 miles), Ellis Road east to NASA Boulevard (1.7 miles), and NASA Boulevard east to Air Terminal Parkway (3 miles). Total: approximately 6.5 miles.
- **From I-95 via West New Haven Avenue (US Highway 192)**: Take I-95/West New Haven exit east to Airport Blvd (2.8 miles), Airport Blvd north to NASA Blvd (1.1 miles), NASA Blvd to Air Terminal Parkway (0.1 mile). Total: approximately 4.0 miles.
- **From US Highway 1 at NASA Boulevard**: Take NASA Blvd west approximately 1.2 miles to Air Terminal Parkway.
- **From State Route A1A (Indialantic) via US Highway 192**: Take 5th Avenue (US Highway 192) in Indialantic west to Airport Blvd (3.9 miles), Airport Blvd north to NASA Blvd (1.1 miles), NASA Blvd to Air Terminal Parkway (0.1 mile). Total: approximately 5.1 miles.

2.5.5.2 I-95 Connector

The FDOT has completed a *Project Development and Environmental (PD&E) Study* for the I-95 Interchange / Ellis Road Project. The project includes a new interchange with I-95 at Ellis Road and the widening and upgrading Ellis Road from John Rhodes Boulevard to Wickham Road on the west side of MLB (see Figure 2-6). The project is planned to connect to NASA Boulevard at the southwest corner of MLB and provide improved access between MLB and I-95. The project was funded under the State of Florida's Strategic Intermodal System (SIS) program and construction is expected to begin in mid-2016. Figure 2-6 depicts the location of the planned interchange and road widening project.



SOURCE: DeLorme Street Atlas USA, 2000; ESA, 2016

FIGURE 2-6
AIRPORT GROUND ACCESS

2.5.5.3 On-Airport Terminal Access

Air Terminal Parkway provides access to the MLB passenger terminal building and public parking lot from NASA Boulevard (see **Figure 2-7**). Air Terminal Parkway is a two-lane, one-way loop road with entry and exit points to the paid public parking lot, rental car return lot, limousine/bus/taxi staging area, and employee parking lots. The road has approximately 540 feet of terminal frontage in front to the main terminal building and a small loop drive in front of the baggage claim area and International Terminal.

Air Terminal Parkway splits into five traffic lanes in front of the main terminal building. The three lanes at curbside are used for loading/unloading and a through lane. The other two lanes, separated by a covered walkway, are used for taxi queuing and ground transportation vehicles. Departing the terminal area, Air Terminal Parkway becomes a three-lane roadway and connects back to NASA Boulevard. Before connecting to NASA Boulevard a terminal return loop is provided to allow re-circulation to the terminal area. A cell phone lot, located on the "Return to Terminal Road", is available for drivers to wait until arriving guests are ready for pick-up.

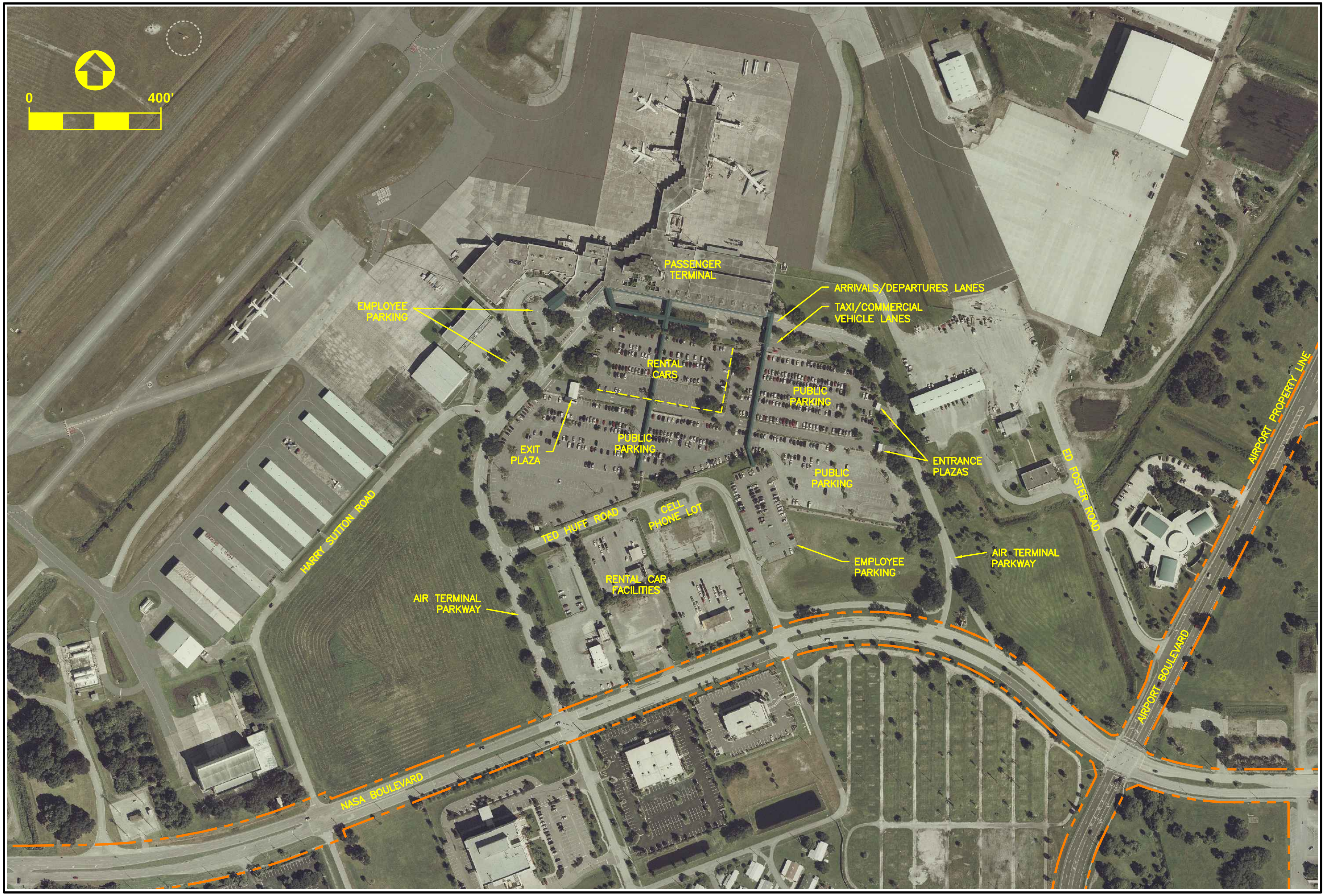
2.5.5.4 Terminal Parking

As shown on Figure 2-7, airport parking at the passenger terminal building is provided in a large surface-level parking lot. The parking lot is divided into public parking areas and a rental car pickup/return lot. Two covered walkways extend from the terminal building into the parking lot for convenience on hot, sunny days or during inclement weather. The longest walking distance from the parking lot to the terminal building is less than 800 feet. The number of parking spaces is provided in **Table 2-10**. Current parking rates are: $1 for the first hour, $1 for each additional 30 minutes, with a daily maximum rate of $11.

TABLE 2-10
MLB PASSENGER TERMINAL PARKING

Type		Spaces
Rental Car Parking		190
Public Parking (Handicap)		18
Public Parking (Regular)		857
Public Cell Phone Waiting Lot		12
Employee		149
	Total	**1,226**

SOURCE: MAA, 2015.



Jan 04, 2017 – 9:27am C:\Users\ddoorie\Documents\MLB\Drawings\Figures\MLB MP Figure 2-7.dwg

Source: ESA, 2016.

FIGURE 2-7
PASSENGER TERMINAL ACCESS AND PARKING

2.5.6 Airport Police and Security

MLB has its own police department, which is staffed by Florida-certified law enforcement officers. The MLB police department is responsible for day-to-day security and law enforcement at the airport, operates MLB's badging program, provides traffic control, and acts as a liaison with TSA to ensure public safety. The MLB police department also handles items lost and found within the terminal.

TSA provides security for the nation's transportation systems, especially air transportation. TSA operates the security screening checkpoint at MLB, where it checks passenger identification and screens passengers and their carry-on luggage for hazardous and prohibited items. The TSA is also responsible for screening checked baggage.

The TSA operates a security checkpoint at the entrance to the domestic concourse. The security screening area currently operates with two lanes, one of which is an "express" (modified pre-check) lane. During peak periods, the TSA operates the security screening checkpoint with an eight minute (or less) average wait, which is cited as a positive experience by many MLB enplaning passengers (when compared to other airports, such as Orlando International).

2.5.7 Airport Museum and Lobby Displays

A museum in the passenger terminal building lobby displays a variety of items and provides information on the history of the airport, including its role as a Naval Air Station during World War II and the airport's long association with the aerospace and aviation industries. Informational displays in the terminal lobby also highlight the area's aerospace and aviation community, including FIT, Northrop Grumman, Harris Corporation, Embraer, and Patrick Air Force Base. The terminal building also displays the work of local artists.

2.6 Aviation Fuel Storage

Retail fuel sales at the airport are provided by its three FBOs. Atlantic Jet Center owns and operates its own fuel tanks and fuels aircraft by truck. Baer Air fuels aircraft by truck and stores its fuel in tanks owned by the MAA. FIT Aviation fuels aircraft by truck, using tanks owned by South Brevard Aviation. Menzies Aviation (formerly ASIG) operates a fuel farm owned by the MAA and delivers fuel via truck to airlines, one FBO, and military aircraft operators at MLB. Approximately 100,000 gallons of Jet-A and 30,000 gallons of Avgas aviation fuel are stored in community tanks owned by the MAA. Menzies Aviation stores 30,000 gallons of JP-8 fuel for military aircraft that use MLB. **Table 2-11** provides a summary of fuel storage at MLB.

TABLE 2-11
MLB AVIATION FUEL STORAGE (ACTIVE TANKS)

Owner	Tank Type	Fuel Type	Capacity (gallons)
Melbourne Airport Authority	Aboveground	Jet-A	50,000
Melbourne Airport Authority	Aboveground	Jet-A	50,000
Melbourne Airport Authority	Aboveground	Avgas	30,000
Menzies Aviation	Aboveground	JP-8	30,000
Atlantic Jet Center	Aboveground	Avgas	20,000
Atlantic Jet Center	Aboveground	Jet-A	20,000
South Brevard Aviation	Aboveground	Avgas	12,000
South Brevard Aviation	Aboveground	Jet-A	12,000
Hangar LLC	Aboveground	Jet-A	12,000
Harris Corporation	Aboveground	Jet-A	10,000
Harris Corporation	Aboveground	Jet-A	10,000
		Total	**256,000**

SOURCES: MAA, 2015; Tank *Facility – All Locations & Tank Information (Brevard County)*. Florida Department of Environmental Management, March 3, 2015.

2.7 Port Canaveral

Port Canaveral is a major Florida cargo hub and is the third busiest multi-day cruise embarkation port in the world[2]. In FY 2013, the port's cruise terminals handled 4 million cruise passengers. The port also has 10 cargo berths and has facilities to handle container shipping, breakbulk, roll-on/roll-off, and bulk cargo. The port has a Foreign Trade Zone and handles more than 4 million short tons of cargo annually.

Port Canaveral is located 22 miles north-northeast of MLB. Depending on the route and traffic, driving times from MLB to the port can range from 30 to 45 minutes. Businesses at MLB use the port to receive aircraft components for assembly and cruise ship passengers occasionally use MLB when traveling to Florida to embark at Port Canaveral.

2.8 Rail Access

A section of the Florida East Coast Railway (FECR) railroad is located adjacent to MLB, just east of the South Apollo Boulevard right-of-way. The railroad line runs from Miami north to Jacksonville, where it connects to other rail networks. The FECR serves Port Miami, Port Everglades, and Port of Palm Beach.

[2] http://www.portcanaveral.com/Cruise/Port-Cruise-Facts

2.9 Meteorological Conditions

2.9.1 Weather Reporting at MLB

An Automated Surface Observing System (ASOS) at MLB reports basic weather elements to pilots, the local community, and the national Weather Service. The ASOS equipment is owned and operated by the National Weather Service. The MLB ASOS reports a variety of weather information to pilots, including, but not limited to, sky conditions, visibility, pressure and altimeter setting, rain/snow/freezing rain, and wind direction and speed.

2.9.2 Mean Maximum Temperature

Local climate data was obtained from the National Oceanic Atmospheric Administration's (NOAA) National Climatic Data Center. NOAA's Monthly Climatological Summary reports for MLB were reviewed to identify the mean maximum temperature for the hottest month. During the 10-year period beginning on January 1, 2005 and ending on December 31, 2014, the hottest month is August with a mean daily maximum temperature of 90 degrees Fahrenheit.

2.9.3 Wind Coverage

Runway wind coverage is that percent of time that crosswind components are below an acceptable velocity. The FAA identifies the desirable wind coverage for an airport as 95 percent. If the wind coverage for a particular runway is less than 95 percent, a crosswind runway is recommended. The most desirable runway orientation provides the greatest runway wind coverage with the least crosswind components, as defined by the ARC for the airport. Table 2-12 denotes the relationship between the acceptable crosswind component limits and RDC.

TABLE 2-12
ALLOWABLE CROSSWIND COMPONENT

Runway Design Code	Allowable Crosswind Component
A-I and B-I	10.5 knots
A-II and B-II	13 knots
A-III, B-III, C-I through D-III, and D-I through D-III	16 knots
A-IV and B-IV, C-IV through C-VI, and D-IV through D-VI	20 knots
E-I through E-VI	20 knots

SOURCE: FAA Advisory Circular 150/5300-13A, Change 1 *Airport Design*. September 28, 2012.

Based on the RDCs for each of the three runways at MLB, the 10.5, 13, 16, and 22 knot crosswind component limits were analyzed. Utilizing the surface meteorological observation data for MLB

over the last 10-year period[3], runway wind coverage for each runway was calculated using the FAA's on-line wind analysis and windrose generator programs. The calculated runway wind coverage is summarized in **Table 2-13** and the windroses for All-Weather, Instrument Flight Rule, and Visual Flight Rule conditions are depicted graphically in **Figure 2-8**.

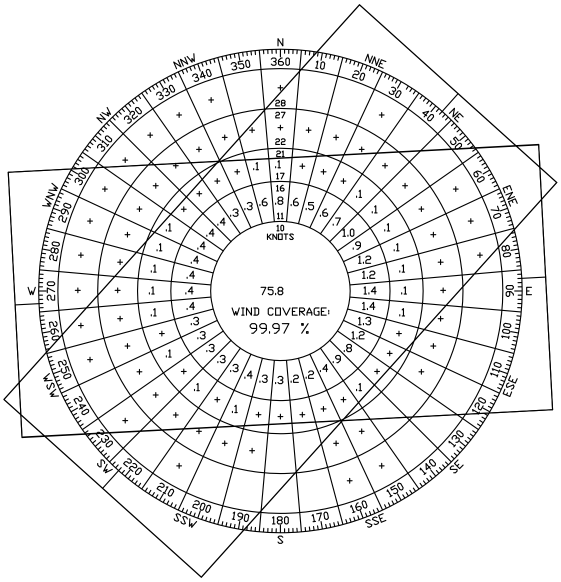
TABLE 2-13
MLB WIND COVERAGE ANALYSIS

Runway	Crosswind Component (knots)			
	10.5	**13**	**16**	**20**
All-Weather				
9R/27L	92.13	96.14	99.14	99.82
9L/27R	92.13	96.14	99.14	99.82
5/23	89.15	94.56	99.00	99.80
Combined	96.73	99.01	99.97	99.97
IFR				
9R/27L	87.92	93.03	97.75	99.33
9L/27R	87.92	93.03	97.75	99.33
5/23	86.65	92.30	97.09	98.97
Combined	94.34	97.73	99.24	99.72
VFR				
9R/27L	97.43	96.37	99.25	99.86
9L/27R	97.43	96.37	99.25	99.86
5/23	89.33	94.74	99.16	99.87
Combined	96.91	99.11	99.89	99.99

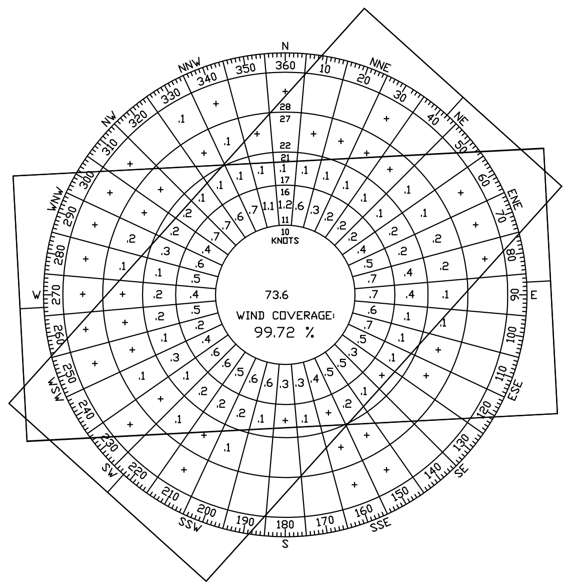
SOURCE: FAA Standard Wind Analysis Tool, 2015.

[3] Station 722040 - Orlando Melbourne International Airport. 2005 – 2014 annual records (102,238 observations).

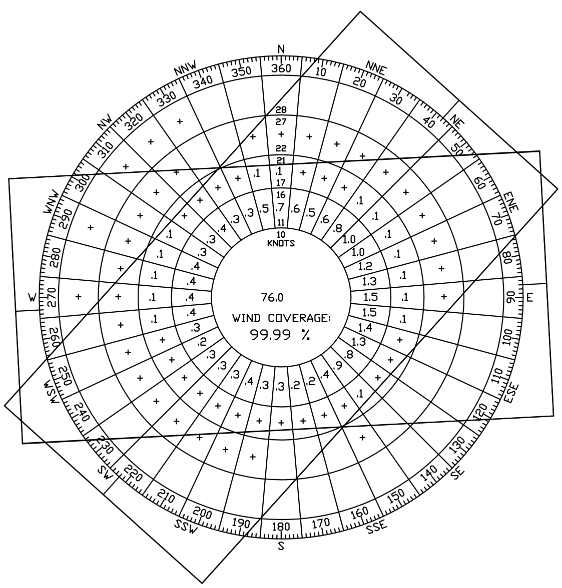
ALL-WEATHER



INSTRUMENT FLIGHT RULE (IFR)



VISUAL FLIGHT RULE (VFR)



Source: FAA Windrose File Generator.

FIGURE 2-8
WINDROSE DIAGRAMS

CHAPTER 3

Forecast of Aviation Activity

CHAPTER 3
Forecast of Aviation Activity

3.1 Introduction

This chapter presents projections of aviation demand that will form the basis for projecting the future development needs at the Orlando Melbourne International Airport (MLB). The standard planning period for an airport master plan is 20 years. Since this study was primarily conducted in 2015, forecasts are presented for 2020, 2025, and 2035 as the key planning periods, with historic data primarily obtained through 2014. Each section incorporates analyses of the historic data, industry trends, and related projections by the Federal Aviation Administration (FAA) and the Florida Department of Transportation (FDOT). For a complete picture of operational activities and emerging trends at MLB, interviews were also conducted with airport management, the passenger airlines, airport tenants, and other significant users of the airfield.

3.2 Historic Airport Data

Historic aviation activity data for MLB was collected from a number of sources, with passenger enplanement and cargo data primarily coming from the airport's monthly reports and official operations counts from the FAA's Operations Network (OPSNET). It should be noted that since the OPSNET data is based on airport traffic control tower (ATCT) records, it only captures those operations occurring with the tower is open (18 hours a day, from 0600 (6:00 a.m.) to 2400 (12:00 a.m.)).

Table 3-1 summarizes the annual passenger enplanements and aircraft operations that have occurred since 2001. These historic figures illustrate how the commercial passenger airline and general aviation activity have fluctuated since the last master plan was developed. This period also reflects the post September 11th environment which significantly changed the operating, security, and costs structures of the aviation industry.

TABLE 3-1
MLB HISTORIC AVIATION ACTIVITY

Year	Passenger Enplanements	Annual Aircraft Operations
2001	280,962	186,269
2002	201,056	189,410
2003	199,865	166,046
2004	203,386	161,551

Year	Passenger Enplanements	Annual Aircraft Operations
2005	232,986	156,520
2006	167,738	158,867
2007	141,252	163,329
2008	149,012	144,265
2009	115,483	141,162
2010	183,971	146,244
2011	205,350	197,334
2012	214,371	166,180
2013	222,980	131,111
2014	224,260	122,655

SOURCE: MAA Records; FAA OPSNET, 2015.

3.3 Recent Aviation Activity Forecasts

The most recent local, statewide, and national forecasts include the MLB Master Plan Update completed in 2004; the FDOT's *Florida Aviation System Plan 2025* (FASP); and the FAA's Terminal Area Forecast (TAF), which was published in January 2015. As each of these provided slightly different forecasts of enplanements and annual operations, each are summarized below. As required by the FAA, a direct comparison of the recommended forecasts must be made with the FAA TAF. This comparison is included at the end of this chapter.

3.3.1 2004 MLB Master Plan Update

The last master plan document prepared specifically for MLB was the *2004 Master Plan Update*. Forecasts for the 20-year planning period of that study were based on historic data through 2001 and projected activity levels at MLB through 2021. The projections shown in **Table 3-2** were extrapolated out to 2035 in order to provide a basis of comparison with the new forecast period evaluated in this Master Plan update.

As shown, both enplanements and operations were projected to increase over the course of the planning period; however, various industry factors and a major recessionary period prevented that growth. For 2011, the previous master plan forecasted 550,400 passenger enplanements and 228,600 aircraft operations. The actual activity experienced in 2011 was 205,530 enplanements and 197,334 operations, respectively. Since 2011, enplanements have increased but operations have decreased significantly. In fact, the total number of aircraft operations nationally remains at levels lower than existed prior to the terrorist attacks on September 11, 2001.

TABLE 3-2
2004 MLB MASTER PLAN UPDATE FORECAST

	Passenger Enplanements	Annual Aircraft Operations
Base Year		
2001	280,962	184,482[a]
Forecast		
2006	388,500	205,100
2011	550,400	228,600
2016	614,500	252,100
2021	686,000	278,000
Average Annual Change	4.6%	2.1%
Extrapolated		
2035	933,620	365,566

[a] Represents FAA Fiscal Year total for 2001.

SOURCE: 2004 Master Plan Update. Data extrapolated by ESA, 2015.

3.3.2 Florida Aviation System Plan 2025

The FASP provides a comprehensive planning and development guide for the state's public airports. The FASP ensures that Florida has an effective statewide aviation transportation system, provides a link to the global air transportation network, and effectively interfaces with regional surface transportation systems. In support of these goals, the FDOT's Aviation and Spaceports Office provides annual updates to historic aviation data and prepares annual aviation forecast of aircraft operations and based aircraft for each airport in the state. The current FASP forecast included historic data through 2013, with projections through 2033. This forecast was also extrapolated to 2035 (**Table 3-3**) for comparison purposes in this study.

It can be determined that aviation in Florida has not been as significantly impacted as the rest of the nation over the past decade. This, coupled with the state's strong economy and population growth, provides much of the reasoning behind the optimistic outlook of activity in the state's system plan.

TABLE 3-3
FLORIDA AVIATION SYSTEM PLAN 2025

	Passenger Enplanements	Annual Aircraft Operations
Base Year		
2013	211,702[a]	131,140
Forecast		
2020	318,322	151,211
2025	425,986	167,433
2033	678,957	197,152
Average Annual Change	6.0%	2.1%
Extrapolated		
2035	762,876	205,387

[a] Enplanements are 5.1% less than those documented by airport in 2013.

SOURCE: FDOT FASP, 2014. Data extrapolated by ESA.

3.3.3 FAA Terminal Area Forecast

The TAF is prepared annually by the FAA to meet the budget and planning needs of the agency, as well as to provide information for use by state and local authorities, the aviation industry, and the public. Projections in the FAA TAF are calculated for each airport in the National Plan of Integrated Airport Systems (NPIAS). In the most recent version of the NPIAS[1], MLB continues to be designated as Non-hub Primary airport. The TAF projections are based on the FAA fiscal year, which begins each year on October 1. The latest TAF issued in January 2015 utilizes a 2013 base year with projections out to 2040.

It is interesting to point out that while the 2015 TAF projects an average annual growth of 0.3 percent for both passenger enplanements and annual operations, the short-term and long-term relative growth rates are not the same. For enplanements, the FAA projects consistent growth for MLB between 2013 and 2040. However, the agency forecasts that annual aircraft operations at MLB will have a slight decline through 2020 and then begin to increase gradually through 2040. **Table 3-4** provides a summary of the projected passenger enplanements at MLB for the Master Plan update study years.

[1] Report to Congress, National Plan of Integrated Airport Systems (NPIAS) 2015 - 2019. Federal Aviation Administration. September 30, 2014.

TABLE 3-4
FAA TERMINAL AREA FORECAST- MLB[a]

	Passenger Enplanements	Annual Aircraft Operations
Base Year		
2013	209,997[b]	130,023
Forecast		
2020	217,037	129,765
2025	220,079	132,357
2035	226,774	137,694
Average Annual Change	0.3%	0.3%

[a] Data based on FAA fiscal year which begins October 1st.
[b] FAA FY2013 enplanements are 5.8% less than CY2013 enplanements documented by airport.

SOURCE: FAA Terminal Area Forecast for MLB, published on July 22, 2015.

3.4 Factors Influencing Forecast Approach

To guide the forecasting effort, an understanding of the relationship between aviation industry trends and the airport operating environment is essential. By comparing historic trends to these elements, it is possible to determine the impact that economic fluctuations, as well as changes in the market and industry, have had on airport activity. Likewise, applying recent or anticipated industry trends can allow educated assumptions to be made as to how a market may be served or activity affected in the future.

National, regional, and local trends with the potential to impact new or expanded service were identified from several sources. In addition to the historic data and recent activity forecasts, information was collected from a number of reports, studies, and industry articles including:

- FAA *Aerospace Forecast (2014 – 2034)*[2]
- MLB *True Market-Leakage Study* (2014)[3]
- MLB *Economic Impact Study Update* (2002)[4]
- FDOT *Florida Statewide Aviation Economic Impact Study* (2014), including MLB's economic impact profile (2014) [5]

The information gathered framed assumptions related to MLB's role in the national air transportation network and how activity may change. The primary goal was to develop an approach

2 FAA Aerospace Forecast, Fiscal Years 2014 – 2034. Federal Aviation Administration.
3 True Market / Leakage Study, Melbourne International Airport, Melbourne, Florida. Sixel Consulting Group, Inc. August, 2014.
4 Melbourne International Airport Economic Impact Update – 2002. Wilbur Smith Associates. November 2003.
5 *Florida Statewide Aviation Economic Impact Study – Technical Report*. Florida Department of Transportation, Aviation and Spaceports Office. August, 2014.

that gives reasonable consideration to these factors while at the same time providing a rational basis on which to select new forecasts.

3.4.1 National Aviation Trends

While the nation's economy will always pose certain challenges to aviation and air travelers, there are some very different dynamics affecting the various forms of transportation, namely commercial passenger service and general aviation.

3.4.1.1 Commercial Passenger Airline Trends

The past decade has brought about a series of events that have influenced activity at airports across the entire country. At the beginning of the decade, many airports experienced a drop in commercial passenger activity due to the events of September 11, 2001. Activity then generally rebounded through 2007 until the economic downturn and the 2008 recession.[6] These economic impacts combined with high fuel prices and competition from low-cost carriers resulted in a series of mergers among the mainline carriers. This consolidation drove changes in airline business models as carriers modified their networks and shifted their focus from growth to efficiency and profitability. The result was reduced service at most commercial service airports, with medium, small, and non-hub airports experiencing the majority of the impacts. **Table 3-5** highlights the consolidation of the six mainline and two low cost carriers. The four resulting carriers, Delta, United, Southwest, and American accounted for 85 percent of total passenger activity in the U.S. in 2013[7].

TABLE 3-5
AIRLINE CONSOLIDATION

Airlines	Integration Period
Delta / Northwest	2008–2010
United / Continental	2010–2012
Southwest / AirTran	2011–2014
American / US Airways	2013–2014

SOURCE: ESA, 2015.

The Massachusetts Institute of Technology's (MIT) International Center for Air Transportation (ICAT) released a series of white papers in 2013 and 2014 that detail research specifically focusing

6 Although the aftereffects lasted much longer, the recession is reported to have begun in December 2007 and lasted through June 2009. In this forecast the recession is generally referred to as the "2008 recession" or the "Great Recession."

7 GAO Report 14-515, June 2014, AIRLINE COMPETITION - The Average Number of Competitors in Markets Serving the Majority of Passengers Has Changed Little in Recent Years, but Stakeholders Voice Concerns about Competition, "Since 2007, there have been four major airline mergers. As a result of this consolidation, about 85 percent of passengers in the U.S. flew on four domestic airlines in 2013."

on recent aviation trends and the impact to air service in smaller communities. Observations from the MIT ICAT research include the following:

- "Capacity Discipline" and the focus on profitability over volume have resulted in an increase in load factors to around 83 percent. Large-hub airports experienced an 8.8 percent decrease in commercial service flights between 2007 and 2012 while smaller airports experienced a 21.3 percent decrease during the same period.
- Fuel price increases (57 percent between 2007 and 2012) have largely rendered the 37 to 50 seat regional jets economically unattractive. This has resulted in disproportionate impacts to air service at smaller airports.
- Southwest Airlines' increased cost and shift in focus from smaller secondary airports to large-hub airports has tempered the "Southwest Effect." Southwest Airlines no longer provides the pricing pressure that induces significant growth at smaller commercial airports. This effect has now largely shifted to low-cost carriers JetBlue and Allegiant.
- Legislative actions continue to place pressure on smaller airports and smaller regional carriers:
  - Federal legislation requiring a minimum of 1,500 flight hours for new pilots may make it more difficult for smaller regional carriers to find pilots. This could drive additional consolidation and renewed focus on the markets with the highest return.
  - Sequestration and the potential impact on contract towers could reduce the attractiveness of smaller Part 139 airports.
  - Air service subsidy programs had an estimated 36.5 percent success rate between 2006 and 2011. Questions about the success of the subsidy programs have placed pressure on the funding stability of the Essential Air Service (EAS) Program and other federal air service subsidies. These pressures could limit the ability of smaller airports to attract and maintain air service.

Taking similar observations into consideration, the FAA has an optimistic outlook for the mainline and regional passenger carriers. In its 2014 Aerospace Forecast, the agency projected modest increases between 2013 and 2034 for most of the passenger traffic indicators. While the FAA 2014 Aerospace Forecast includes system-wide projections (both domestic and international markets), only those for the domestic passenger industry have been summarized in this section.

The FAA 2014 Aerospace Forecast documents the increase in domestic annual enplanements that has occurred since the 2008 recession. The FAA predicts the annual increases that have occurred since 2010 will continue into the future at an average annual rate of 1.9 percent. This expected growth is nearly equal between the mainline and regional carriers and results in just under one billion domestic enplanements by 2034.

System-wide capacity, also known as available seat miles (ASMs), is also projected by the FAA to increase over time. For the domestic portion, U.S. commercial air carriers (mainline and regional combined), are projected to increase ASMs an average of 2.0 percent each year through 2034. Similarly, the FAA is confident the revenue passenger miles (RPMs) of the airlines will also

continue to expand, based on a growing U.S. economy. RPMs are the basic measure of the airline passenger traffic produced. The FAA expects RPMs to increase at an annual rate of 2.0 percent for the domestic market of all U.S. commercial air carriers. For ASMs and RPMs, the growth is generally equal between the mainline and regional carriers.

Commercial airlines are also projected to continue to maximize the utilization of their aircraft. With the exception of only a few years over the past decade, both mainline and regional carriers have consistently increased their load factor, indicating how efficiently seats are being filled. System-wide, domestic load factors are projected by the FAA to grow from the 2013 average of 83.5 percent to 84.5 percent by 2025. This growth rate then tapers off with an average load factor of 84.7 percent expected by 2034. Most of this growth is predicted for the mainline carriers, as the average load factor for the regional airlines are expected to have a slight decrease in the next ten years, and then return to approximately the same levels as that experienced in 2013.

3.4.1.2 General Aviation Industry Trends

General aviation (GA) encompasses all segments of the aviation industry except for the activity that is conducted by scheduled airlines or the military. Examples include pilot training, law enforcement flights, medical transportation, aerial surveys, aerial photography, agricultural spraying, advertising, and various forms of recreation, not to mention business, corporate, and personal travel.

Shortly after the GA industry emerged from the impacts of the events on September 11, 2001, the industry experienced major advances in aircraft and navigation technologies (predominantly between 2003 and 2007) which created new products and services during a period with an overall good economy. This included widespread use of Global Positioning Satellites (GPS) applications in the cockpit for both enroute navigation and instrument approach procedures. This period also resulted in the emergence of very light jet (VLJ) aircraft and the introduction of an entirely new category – the light sport aircraft. While these advances improved most every segment of the GA industry, there was still little to no growth in the total activity during this period.

By the end of 2008, most segments of the industry experienced losses as the overall national economy declined into the Great Recession. The VLJ industry was hit hardest as most manufacturers stalled development plans and/or went bankrupt. Even though the GA industry continued to struggle through 2012, activity has begun to rebound and a number of positive signs are on the horizon, including re-emergence of a number of VLJ manufacturers and growth in the light sport aircraft category. In 2011, the General Aviation Manufacturer's Association (GAMA) reported an increase in new GA shipments for the first time since 2007. For general aviation aircraft manufactured in the U.S., this figure has increased each year from the delivery of 1,323 new aircraft in 2011 to 1,631 in 2014. Even business jet activity has been experiencing strong positive growth after experiencing a 20 percent decrease in total activity as a result of the negative press during the 2008 to 2009 corporate bailouts. Many companies have started to use general aviation as an essential part of their businesses again and the 2014 FAA Aerospace Forecast projects business jet activity to continue to lead the recovery.

Overall, the 2014 Aerospace Forecast projects positive growth over the next 20 years, despite the industry fluctuations that are likely to continue. According to the FAA, the number of active GA aircraft is expected to increase 0.5 percent annually through 2034. The interesting aspect of this growth in the GA fleet is that piston aircraft are actually expected to decline 0.3 percent annually for the period while the share of turbine powered aircraft are forecast to grow 2.6 percent each year. The number of hours flown by all GA aircraft is also projected to increase at a rate of 1.4 percent each year. Similar to the total fleet projections, the hours flown by turbine aircraft are forecast to grow 3.2 percent annually while piston aircraft show a slight decline. These turbine aircraft projections are supported by figures in the FAA's monthly Business Jet Reports which shows since the low in 2009, operations conducted by GA jet aircraft have consistently increased through 2014. They are however, still below the level recorded for 2007, prior to the 2008 and 2009 corporate bailouts.

3.4.2 Regional Market Area

A number of different elements define the region or catchment area of an airport's users. Geographical features, services offered, and competing facilities are primary factors in determining the true market area for an airport. The service area described in this section focuses on the commercial passenger market. While it also defines some characteristics of the GA users, they typically depend on more specific features of the airport and immediate surrounding area. This is especially true in Florida where there are a numerous airports capable of supporting significant GA operations.

Past studies for MLB have primarily utilized the Palm Bay-Melbourne-Titusville Metropolitan Statistical Area (MSA) as the basis for the airport service area. This MSA, which shares the same boundary as Brevard County, was used in the *2002 Melbourne Florida International Airport Catchment Area Leakage Study*, the *2004 MLB Master Plan Update*, and the *2012 Melbourne International Airport Air Service Profile*[8]. However, the recently completed *2014 True Market-Leakage Study* for MLB also incorporated the Sebastian-Vero Beach MSA (which coincides with Indian River County) in the definition of the commercial passenger market area. Using passenger survey and ticket data between April 2003 and March 2014, the *2014 True Market-Leakage Study* calculated 20.9 percent of MLB's passengers were from Indian River County. Of the total air passenger data from both counties for the same period, the *2014 True Market-Leakage Study* determined 12.1 percent used MLB.

For this study, MLB's passenger market area is considered the same as defined in the *2014 True Market-Leakage Study* (see **Figure 3-1**), although it is recognized that some users also originate from outside the two-county region. Both Brevard and Indian River Counties are bounded by the Atlantic Ocean to the east and sparsely populated areas along the St. Johns River to the west. This two county region spans from the Titusville / Kennedy Space Center area at the northern end to Vero Beach at the south. Primary travel corridors run north/south due to the market area's location along the east coast of Florida. These include Interstate 95 (I-95) which transits through the middle

[8] *2012 Airport Air Service Profile, Melbourne International Airport*. Prepared by Kimley-Horn and Associates, Inc. for the Florida Department of Transportation. May 2012.

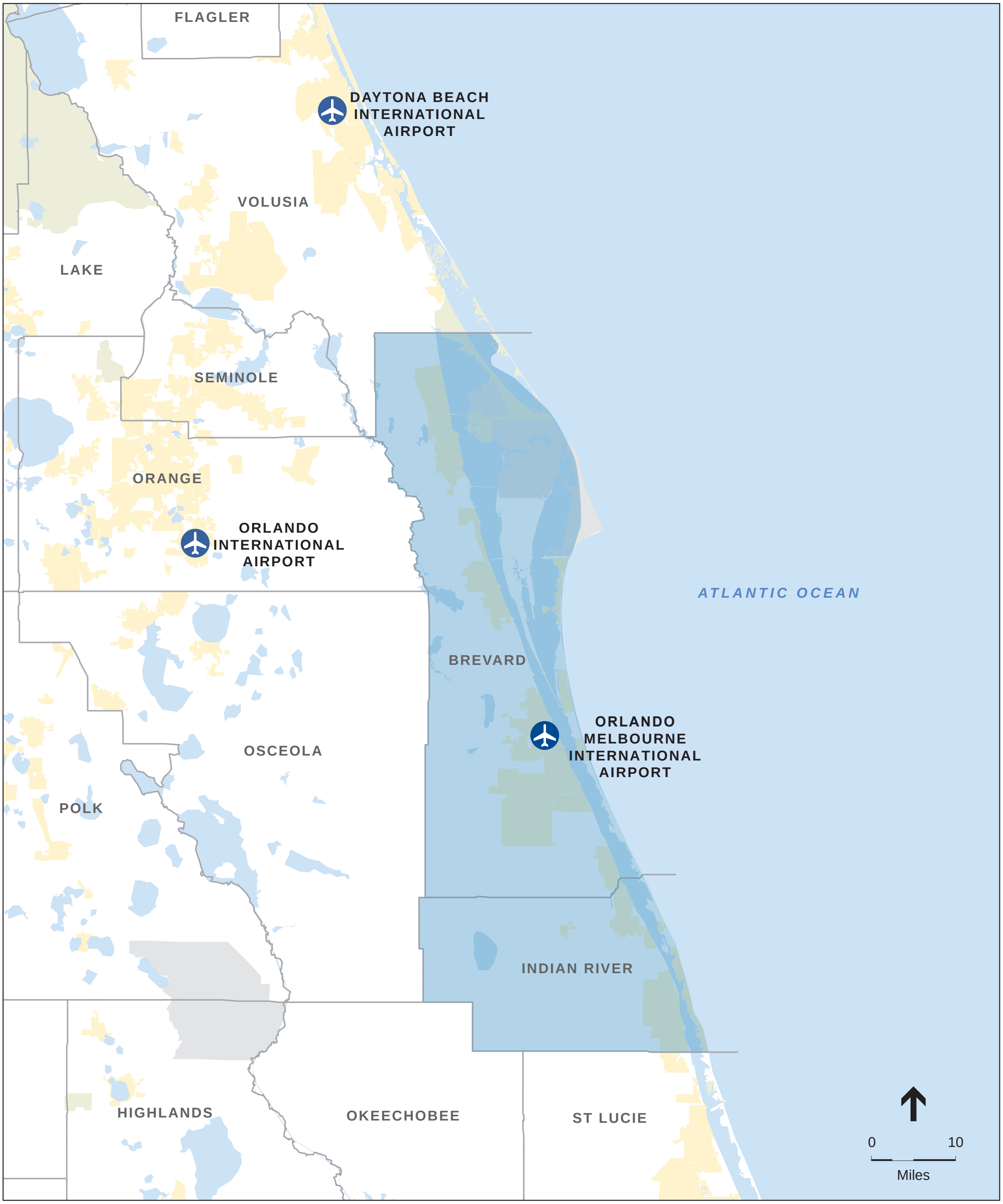
of both counties, U.S. Route 1 along the mainland coast, and Florida State Road A1A along the barrier islands of the Indian River Lagoon. The Martin B. Andersen Beachline Expressway (State Road 528) provides a connection between Orlando and Interstate 95, east coast Florida beaches, and the Kennedy Space Center.

3.4.3 Passenger Airline Service

Regularly scheduled passenger service to MLB is provided by Delta Air Lines and American Airlines.[9] The regional carrier PSA Airlines conducts the American Airlines flights as an affiliate under the American Eagle brand. Currently, Delta and American provide multiple daily nonstop flights to their respective hubs in Atlanta and Charlotte. Based on the February 2015 schedule, the two airlines operate a combined total of six to seven round trip flights each day (including most weekend days). This is consistent with the 6.3 average daily departures documented in the *2014 True Market-Leakage Study*. As common in tourist destination areas, the airlines serving MLB may make adjustments to aircraft types and/or flights at MLB during peak tourism periods (i.e., Spring Break).

Passenger service is also provided by Elite Airways and Apex Executive Jet Center (formerly Baer Air), both of which base their fleet out of MLB. Traditionally Elite Airways has primarily provided on-demand charter service, specializing in flights for the sports industry. Operating a fleet of regional jet aircraft, they also provide different point to point routes and recently announced intention to expand non-stop service to Washington D.C. and New York City. As their home airport, Elite intends to expand the overall operation at MLB, including exploring new domestic and international opportunities for both the business and leisure markets. Apex Executive Jet Center utilizes a mix of multi-engine piston, turboprop, and jet aircraft for their charters. While they conduct both domestic and international operations, much of their business is derived from flights to the Bahamas.

9 The merger between US Airways and American Airlines was approved in 2014. US Airways began operating at MLB as American Airlines in early 2015.



SOURCE: DeLorme Street Atlas USA, 2000; ESA, 2016

FIGURE 3-1
ORLANDO MELBOURNE INTERNATIONAL AIRPORT SERVICE AREA

3.4.4 Competing Commercial Service Airports

MLB's market area is impacted significantly by the proximity of other commercial service airports in the region, especially the Orlando International Airport (MCO). As noted previously, a significant majority (87.9 percent) of the passengers from MLB's two-county catchment area took flights from other area airports. Approximately 72.3 percent of the passengers in the catchment area took flights from MCO. The passenger draw from these competing airports is due to the relative ease by which many can be reached (drive times); the number and type of destinations available; availability of more non-stop flights options; and the presence of one or more low-cost carriers.

While MLB is the only commercial service airport in either Brevard or Indian River Counties, the *2014 True Market-Leakage Study* showed that passengers in this area also utilized five other airports. These included MCO and the Orlando Sanford International Airport (SFB) to the northwest and the Palm Beach International Airport (PBI), Fort-Lauderdale Hollywood International Airport (FLL), and Miami International Airport (MIA) to the south. **Table 3-6** compares general air service information for the airports that capture the MLB market area passengers. The non-stop destinations, daily departures, and seats per day data were obtained from the *2014 True Market-Leakage Study* which used schedules and information from September 2014.

Daytona Beach International (DAB) was also identified as a commercial airport within the region, but attracted insignificant passenger numbers from the MLB market. This is likely due to the fact that DAB has very similar daily service from Delta and American. It is interesting to note, that on February 13, 2015, JetBlue announced daily service between DAB and New York, which will begin in the early part of 2016.

TABLE 3-6
COMPETING COMMERCIAL SERVICE AIRPORTS

	Number of Non-Stop Destinations	Average Daily Departures	Average Seats per Day	2013 Annual Enplanements	Distance from MLB	Drive Time from MLB (no traffic)
Orlando Sanford International (SFB)	36	10.5	1,977	944,000	76 miles	1h 16m
Orlando International (MCO)	94	311	47,555	16,945,000	61 miles[a]	58m
Melbourne International (MLB)	**2**	**6.3**	**689**	**223,000**	**-**	**-**
Palm Beach International (PBI)	21	51	6,651	2,824,000	116 miles	1h 42m
Fort Lauderdale-Hollywood International (FLL)	96	225	31,783	11,530,000	161 miles	2h 21m
Miami International (MIA)	138	379	56,808	19,242,000	177 miles[a]	2h 37m

[a] Fastest route (without traffic) has tolls.

SOURCE: *2014 True Market-Leakage Study*, January 2015 FAA TAF (enplanement figures), and Google Maps.

3.4.5 Florida's Space Coast

For more than 50 years, Brevard County has been the home of the nation's manned and unmanned space flight programs. In addition to NASA's launch facility headquarters at Kennedy Space Center, the area also has Cape Canaveral Air Force Station and Patrick Air Force Base, all of which play a major role in the nation's space program. Supporting this, the area has become home to some of the world's leading high-tech industries and a significantly educated and skilled workforce. This has resulted in a number of higher education institutions being established in Brevard County, including the main Florida Institute of Technology and Eastern Florida State College campuses. There are also two campuses for the University of Central Florida, as well as campuses for Barry University, Everest University, Keiser University, Webster University, and Columbia College. The Florida Institute of Technology, Keiser University, and Eastern Florida State College have a presence at MLB.

Although the end of the Space Shuttle program in 2011 resulted in the loss of approximately 8,000 NASA and civilian jobs in the region, private employers on the Space Coast have created more than 5,000 jobs since 2010.[10] The key to the area's recovery plan was: 1) diversification while maintaining a focus on aerospace and aviation and 2) capitalizing on the well-trained, highly educated workers in the area. As a result, many of the new jobs in Brevard County are associated with aerospace, aviation, engineering and other high-technology sectors. Large companies like Embraer, Northrop Grumman, General Electric, and Harris Corporation and numerous small businesses have provided new job opportunities at MLB.

The Space Coast also has Port Canaveral, the second busiest cruise port in the world with a variety of cruises offered by Carnival Cruise Lines, Disney Cruise Line, Norwegian Cruise Line, Royal Caribbean International, and others. From a commercial standpoint, Port Canaveral is a significant bulk and container cargo seaport offering a deep water channel, various dock facilities, and Foreign Trade Zone 136. Both residents and visitors enjoy Brevard's 72 miles of coastline, the Indian River Lagoon, St. Johns River, and numerous parks, including the Merritt Island National Wildlife Refuge. The area offers a number of other year round outdoor activities such as golf, fishing, boating, tennis, and eco-tourism due to the climate.

The items described above are just some of the reasons the area has attracted and maintained its permanent resident base, area businesses, and annual visitors. This has resulted in the growth of a number of retail, manufacturing, hospitality, and service industries across the area, including a significant health care industry and one of the state's leading public school systems. All of the above helped generate the 3.5 million business and leisure air travelers from the area as documented in the *2014 True Market-Leakage Study* between April 2013 and March 2014.

3.4.6 Local Socioeconomic Factors

Population, employment, and income data were evaluated as they typically have a direct relationship to air travel and airport activity. Overall growth rates and average annual growth rates

[10] "On Space Coast, Signs of Comeback After End of an Era". *New York Times*. March 29, 2013.

for Brevard County, Indian River County, Florida, and the United States are presented based on socioeconomic data obtained for this study from Woods & Poole Economics, Inc.[11] The Woods & Poole projections are updated annually, utilizing models which take into account specific local conditions based on the historic data back to 1969. [12] While the current historic data sets from Woods & Poole cover the period from 1969 to 2011, only data back to 2001 was evaluated for comparisons with the enplanements and operations over the same period.

The detailed projections for both Brevard and Indian River Counties provide an indication of future trends for the airport's catchment area. Because the economies of adjoining counties are intertwined to a certain extent, the projections made for one county are considered in light of projections of surrounding counties, which provides a realistic regional outlook.

3.4.7 Population

There has been slightly less overall and average growth in Brevard County's population when compared to that of the State of Florida. Nonetheless, the population in Brevard County has experienced steady growth since 2001 (see **Table 3-7**). Indian River County has also experienced growth, but with higher averages than those of the state. For both counties and the state, the historic growth in population has exceeded the rates for the nation as a whole, and is expected to continue to do so in the future, albeit at a slightly lower rates.

TABLE 3-7
TOTAL POPULATION

Year	Brevard County	Indian River County	State of Florida	United States
Historic Data				
2001	486,429	115,456	16,356,966	284,968,955
2002	495,425	118,144	16,689,370	287,625,193
2003	504,847	120,450	17,004,085	290,107,933
2004	518,722	125,001	17,415,318	292,805,298
2005	529,907	127,955	17,842,038	295,516,599
2006	535,138	131,463	18,166,990	298,379,912
2007	539,719	134,564	18,367,842	301,231,207
2008	542,378	136,277	18,527,305	304,093,966
2009	542,109	137,016	18,652,644	306,771,529
2010	543,828	138,268	18,838,613	309,330,219
2011	543,566	138,894	19,057,542	311,591,917
Overall Growth (2001 – 2011)	11.7%	20.3%	16.5%	9.3%
Average Annual Change	1.1%	1.9%	1.5%	0.9%

[11] 2014 State Profile (including MSA and County Profiles). Woods & Poole Economics, Inc. 2015.

[12] Based on US Census Bureau data, the company develops detailed population data by age, sex, and race; employment and earnings by major industry; personal income by source of income; retail sales by kind of business; and data on the number of households, their size, and their income.

Year	Brevard County	Indian River County	State of Florida	United States
Forecast Projections				
2020	594,055	156,365	21,658,115	340,554,347
2025	622,116	166,512	23,197,671	357,193,542
2035	675,221	186,972	26,383,455	390,162,755
Average Annual Change	0.9%	1.2%	1.4%	0.9%

SOURCE: Woods & Poole Economics, Inc., 2015.

3.4.8 Employment

Employment data provides an indication of the economic conditions and stability for a geographic area. As with population, Brevard County had slower growth while Indian River County had higher growth relative to the state (see **Table 3-8**). However, future projections show employment for Brevard, the state, and nation increasing at a higher rate than those since 2001. Indian River is projected to have the same growth as it has in the past, which is higher than the other geographic areas.

TABLE 3-8
TOTAL EMPLOYMENT

Year	Brevard County	Indian River County	State of Florida	United States
Historic Data				
2001	246,615	55,752	8,917,148	165,510,145
2002	246,566	56,937	9,055,993	165,063,008
2003	255,788	61,068	9,286,027	166,019,479
2004	267,501	62,882	9,661,608	169,026,733
2005	277,902	66,085	10,087,919	172,551,350
2006	285,447	69,670	10,407,359	176,124,643
2007	285,018	70,263	10,577,329	179,899,653
2008	274,791	68,731	10,324,518	179,644,834
2009	264,183	65,345	9,906,895	174,225,644
2010	261,873	65,299	9,878,416	173,626,671
2011	261,646	66,248	10,008,703	175,834,720
Overall Growth (2001 - 2011)	6.1%	18.8%	12.2%	6.2%
Average Annual Change	0.6%	1.7%	1.2%	0.6%
Forecast Projections				
2020	288,427	77,526	11,633,394	198,343,547
2025	304,406	84,475	12,629,907	212,071,067
2035	338,981	99,982	14,844,292	242,442,108
Average Annual Change	1.1%	1.7%	1.7%	1.3%

SOURCE: Woods & Poole Economics, Inc., 2015.

3.4.9 Income

Personal per capita income provides a valuable indication of the economic conditions for a specific area. The figures represent the ratio of total personal income, before income taxes, to the total resident population with adjustments if the income was made in a different area than where the person resides. Unlike population or employment, Brevard County has had the most growth in per capita income when compared to Indian River, the state, or nation (see **Table 3-9**). In the future, higher rates are expected for all when compared to the historic growth.

TABLE 3-9
TOTAL PERSONAL INCOME PER CAPITA (IN CURRENT DOLLARS)

Year	Brevard County	Indian River County	State of Florida	United States
Historic				
2001	$28,134	$39,186	$29,804	$31,157
2002	$28,791	$39,993	$30,463	$31,481
2003	$29,872	$41,060	$31,241	$32,295
2004	$31,440	$47,458	$33,463	$33,909
2005	$33,172	$49,814	$35,489	$35,452
2006	$35,303	$55,688	$37,996	$37,726
2007	$36,590	$56,122	$39,256	$39,507
2008	$37,686	$58,528	$39,978	$40,947
2009	$36,011	$47,689	$36,849	$38,637
2010	$36,675	$48,726	$38,345	$39,791
2011	$38,028	$50,977	$39,636	$41,561
Overall Growth (2001 - 2011)	35.2%	30.1%	33.0%	33.4%
Average Annual Change	3.1%	2.7%	2.9%	2.9%
Forecast Projections				
2020	$51,365	$68,661	$53,787	$56,808
2025	$65,185	$88,176	$68,606	$72,344
2035	$108,139	$150,613	$115,068	$120,708
Average Annual Change	4.5%	4.6%	4.5%	4.5%

SOURCE: Woods & Poole Economics, Inc., 2015.

3.5 Projections of Passenger Enplanements

Enplanements, or the number of passengers departing the airport, are the most common measure used in the aviation industry to gauge passenger activity. As such, they define many key elements of an airport's operations such as the aircraft used by airlines, various terminal building components, and even landside facilities. Historically, most of the passenger activity at MLB has been domestic with international enplanements primarily limited to flights conducted by on-

demand charter carriers. Therefore, the passenger projections described in the following sections and summarized in **Table 3-10**, primarily reflect domestic enplanements.

Because the number of annual international enplanements at MLB has varied over time and has been associated with on-demand charters, it is difficult to reliably forecast this type of enplanements. In addition, recent efforts by MLB management to attract and grow international flights show strong promise and could easily result in a substantial increase of international enplanements at the airport. For this reason, an International Charter scenario was developed for this forecast. Because the addition of a just a few new daily scheduled flights (over and above those projected in the "baseline" forecast) could have a significant effect on the number of annual enplaned passengers at MLB, a High-Growth scenario was also developed for this forecast. Both of these scenarios are realistic and achievable under the right conditions, and have been included in this forecast to acknowledge the potential additional demand that could be placed on MLB's facilities over the 20-year planning period. These two alternative growth scenarios are presented at the end of this section.

3.5.1 Historic Trend Analysis

A common projection method is to simply apply the historic growth rate to the base year figure. As discussed in Section 3.1, MLB has experienced both increases and declines in the number of enplaned passengers over the past 14 years. While enplanements have steadily increased since 2009, they have yet to reach levels recorded prior to September 11, 2001. The result is an overall decline for the historic data, which would create a negative trend-based projection for the future.

While the terrorist attacks certainly impacted the entire airline industry, it was not the only significant point of decline for MLB. Between 2001 and 2002, MLB lost approximately 28 percent of its enplanements as result of the attacks and the economic slowdown experienced at that time. However, the same percentage of passengers was also lost between 2005 and 2006 due to changes in the airlines and flights offered at MLB. It was at this point in time that the airport received a Small Community Air Service Development Grant to help stimulate passenger service. Unfortunately, despite this assistance, MLB also lost 23 percent of its enplanements between 2008 and 2009 as a result of the 2008 recession and its aftereffects. It should be noted that MLB was not alone in recording declines after 9-11 and the 2008 recession. Many air carrier airports in Florida and in the national system experienced substantial declines in enplaned passengers during the same periods.

The airline industry is very cyclical, and while MLB will most certainly experience fluctuations in passenger levels in the future, it is believed that the overall trend will be positive. A conservative estimate of that growth has been made by applying the average annual growth of enplanements at MLB between 2006 and 2014. While this historic period removes much of the industry-wide impacts incurred immediately after 9-11, it still reflects the fluctuations in activity at MLB over the past decade. This includes the airport's drop to its lowest passenger levels in 2009 and the recent rebound in business and personal air travel. When the 2006 to 2014 average annual growth of **3.7 percent** is applied to the baseline number of enplanements, just over **480,600** annual passenger enplanements would be expected at MLB by 2035.

3.5.2 National Growth Trend Analysis

A forecast was generated based on the growth rate expected by the FAA for all domestic enplanements in the United States. As described, the FAA's 2014 Aerospace Forecast documents the increase in domestic enplanements (combined mainline and regional carriers) for the nation which has occurred since the end of the recession in 2009. The FAA expects this growth to continue at an average annual rate of **1.9 percent** through 2034. This growth is nearly equal between the mainline and regional carriers, and has been utilized since passenger activity at MLB is primarily split between mainline and regional service. When this growth rate is applied to the baseline number of passenger enplanements, the result is nearly **333,000** enplanements at MLB by 2035.

3.5.3 Market Share Trend Analysis

Another projection based on the FAA's domestic enplanement forecast for the nation was created using market share analysis in which historic enplanement data for MLB was compared to the corresponding national passenger enplanement data. The calculated average of the nation's domestic passengers originating from MLB (local market share) was then applied to the FAA's future passenger enplanement projections for the nation. Assuming that MLB would retain approximately the same market share over time, this approach showed that **354,500** enplanements could be generated at MLB by 2035.

3.5.4 Regression Analyses

Regression analysis was also used to estimate the enplanements for the planning period. Individual and combined groups of socioeconomic data were compared to historic passenger levels to identify correlations between passenger activity and independent variables associated with the MLB market area. These models were built on the premise that the tendency for people to travel by air is related to key socioeconomic indicators. Specific assumptions include:

- **Population** was selected based on the assumption that the number of enplanements in an area may be affected by the number of people living in the area
- **Employment** data was selected as it is considered to indicate the relative growth and/or stability of the market area's economy and business related travel appears to be a key component of passenger activity at MLB.
- **Income** data was selected because the use of aviation has a level of expense that may affect a person's decision to travel by air or by other modes of transportation. In other words, it is believed that people may choose air travel as their income levels increase.

A variety of projections were made employing the combined socioeconomic datasets previously presented for both Brevard and Indian River Counties. Initially, separate simple regression analyses were conducted using population, employment, and income as single independent variables. While none of the individual variables had a significant correlation, each variable demonstrated the expected relationship with historic enplanement data. Much higher correlations were created in the multiple regression models which evaluated different combinations of independent variables.

The multiple regression model that showed the most significant correlation was the one that analyzed all three socioeconomic variables described above. For any model with multiple independent variables, an adjusted R^2 is used as the coefficient of determination. An adjusted R^2 value of zero shows no relationship and values approaching 1.0 show a strong relationship and overall fit between the estimated regression equation and the sample data. Typically, values of 0.95 or higher indicate a significant relationship. The final regression model had an R^2 of 0.96. Using the regression model to predict annual passenger enplanements at MLB based on forecasted population, employment, and income data, approximately **693,100** enplanements would be generated at MLB by 2035.

3.5.5 Comparison of Annual Enplanement Forecasts

The new forecasts of annual enplanements are summarized in **Table 3-10** and presented graphically in **Figure 3-2** alongside the other recent aviation activity forecasts. These provide the foundation from which the final recommended forecast was developed. It is interesting to note that among all forecasts reviewed and developed for this study, the FAA TAF shows a slight decrease in passengers at MLB in the 2015 timeframe and by far has the lowest projection of passengers for MLB (0.03 percent average annual growth rate). For this study, the FAA TAF represents the Low-Growth scenario. The FAA TAF is further discussed and compared to the MLB recommended forecast at the end of this chapter.

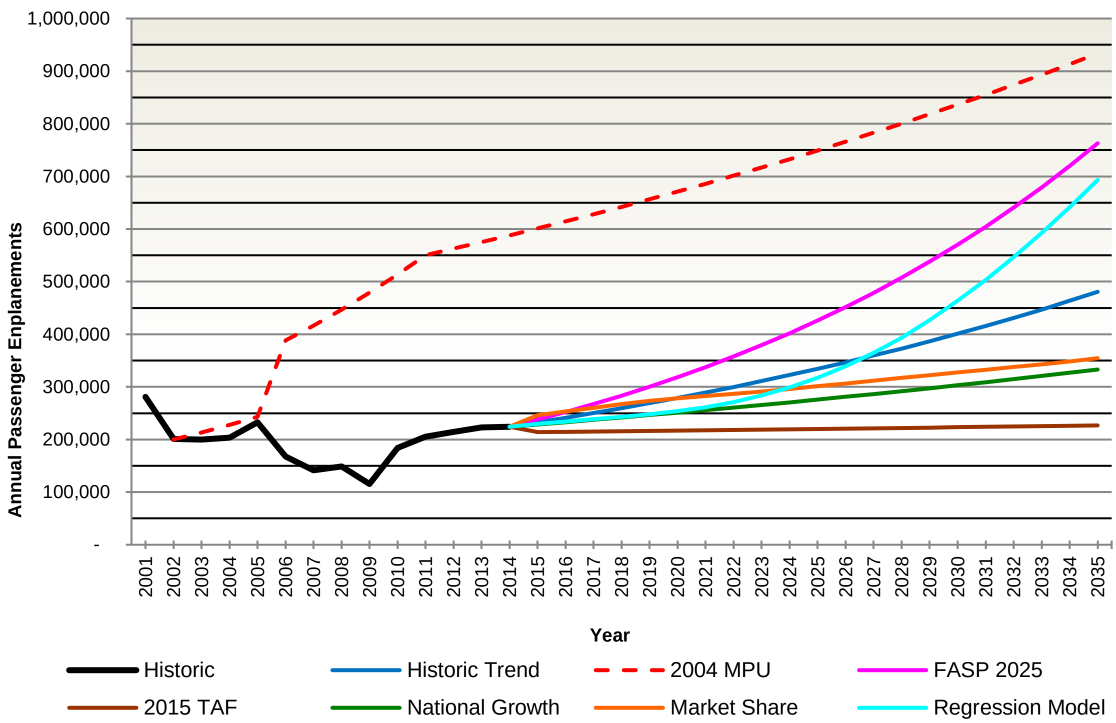
Of the new forecasts produced, the National Growth, Market Share, and Historic trends were eliminated from further evaluation. While each utilized FAA-recommended methods, their inability to reflect the most current local developments resulted in projections which underestimate the activity potential for MLB. For example, even though the National Growth projection incorporated the continued recovery of the domestic airline industry, the system-wide growth did not truly reflect the recovery experienced at MLB. For MLB, 2009 was the lowest level of enplanements recorded over the past 35 years and since that time the annual increases (through 2014) have averaged 14.2 percent. Similarly, while the Market Share analysis incorporated a better link between national growth rates and local conditions, the level of passenger enplanements projected towards the end of the 20-year planning period were in the same range as those for MLB in the 1990s. Such an analysis would have to be much more complex to reasonably estimate how the existing and future airline service improvements at MLB would increase MLB's market share. Conversely, while the Historic trend reflected local conditions, it was not retained as it was considered constrained with respect to the passenger potential at MLB. For instance, while the recent expansion of area businesses including, but not limited to Embraer; Harris Corporation; maintenance, repair, and overhaul (MRO) operators; Northrop Grumman; and Satcom Direct have occurred within the historical period evaluated, the resulting potential to stimulate passenger activity often takes time to mature. The following section describes how the regression model was determined to be the best method to project this potential and therefore provided the basis of the recommended forecast.

TABLE 3-10
PROJECTIONS OF MLB PASSENGER ENPLANEMENTS

	Historic Trend	National Growth	Market Share	Regression Model
Base Year				
2014	224,260	224,260	224,260	224,260
Projected Forecast				
2020	278,832	251,071	278,497	253,907
2025	334,324	275,847	301,203	317,479
2035	480,638	332,974	354,535	693,093
Average Annual Change	3.7%	1.9%	2.2%	5.5%

SOURCE: ESA, 2015.

Figure 3-2: Projections of MLB Passenger Enplanements



Source: ESA, 2015.

3.5.6 Recommended Passenger Enplanement Forecast

The future passenger enplanements predicted by the regression model were adjusted to develop the recommended forecast for this Master Plan update. No matter how statistically significant, a regression result cannot prove causality (actual cause and effect relation) among the variables. This is certainly the case with passenger enplanements where many other factors, such as tourism, emerging markets, local business growth, daily service, available non-stop destinations, ticket

price, competition, and even marketing efforts are significant – but difficult to model. As illustrated in Figure 3-2, the regression analysis resulted in exponential future passenger enplanement growth. While the regression model is based on historic data, the predicted future exponential growth likely stems from the short-term projections of the independent variables. Whereas the market area population has had steady growth throughout the historic period utilized, both the number of jobs and income levels had significant decreases during and after the 2008 recession. In the regression model datasets, the area's job loss that began in 2008 is not projected to fully recover to pre-recession levels until 2018 and similarly, decreases in income levels are not expected to recover until this year (2015). Conversely, the losses in enplanements at MLB that could be attributed to the recession were regained in the first year or two after 2009.

More recent socioeconomic data from portions of the passenger service area show a much faster recovery, with employment being perhaps the best example. Regardless, the independent variable datasets were retained for consistency in the regression model. As such, the resulting projection is considered relevant to future enplanement levels; however, it requires an adjustment to better reflect current local area dynamics which have the potential to increase passenger levels at MLB over the next 10-year period. This adjustment replaced the increasing annual growth rates from the model with the overall average annual growth to reflect the expected higher enplanement levels for the short-term and intermediate planning periods. In addition to the fact that enplanements have already exceeded losses since 2005, the adjusted forecast is supported by the observations and assumptions of the following sections.

3.5.6.1 Ability to Capture Additional Market Share

The *2014 True Market-Leakage Study* showed that between April 2013 and March 2014, only 12.1 percent of the nearly 3.5 million total commercial air passengers from the Melbourne market area used MLB. While MLB does have significant competition in the region, especially nearby Orlando International Airport, the area's passenger base, airline opportunities, and airport infrastructure gives MLB the ability to increase enplanements beyond the current 12.1 percent retainage. If the retainage of the current area passengers were to increase to just 15 percent, the airport would capture an additional 50,000 annual enplanements. This is considered to be reasonable and achievable given the expanding opportunities for both business and leisure travelers in the surrounding market area.

Business Travel Potential – From a business standpoint, the MLB market area continues to create high paying, high-tech jobs. The Economic Development Commission of Florida's Space Coast has identified the leading industries of the area to include advance security, aviation/aerospace, communications, electronics, and emerging technologies, as well as health care and education. Some of the companies in these industries are also the largest employers in the area and are based at or near MLB. These include, but are not limited to, Harris Corporation, United Space Alliance, Northrop Grumman Corporation, Rockwell Collins, Boeing, Lockheed Martin, Raytheon Company, DRS Technologies, and MC Assembly. MLB has also been at the center of the area's growth since the end of the 2008 recession with the establishment of the Florida Tech Research Park; Embraer's Executive Jet headquarters and assembly lines; Discovery Aviation's aircraft manufacturing and composite operations; and the MRO operators.

Leisure Travel Potential – Not only is the general population base growing, but the area's tourism and hospitality market has also been expanding annually. Leading this growth has been the cruise industry. In 2013, Port Canaveral recorded 4 million total passengers, which the Canaveral Port Authority projects to grow by 50 percent in the next four to five years. In anticipation of this, Port Canaveral's current plans are to double its capacity over the next several years. In addition, MLB is in proximity to the area's numerous attractions.

3.5.6.2 Opportunities to Enhance Passenger Service

Even with the potential passenger base, the challenge remains to expand the airline service at MLB in a sustainable manner. This of course requires the right mix of daily service, non-stop destinations, price, and customer conveniences.

Daily Service and Non-Stop Destinations – The ability to provide additional flights to both existing and new destinations is certainly a strategic business decision of the airlines operating at MLB. However, given that the current airlines each serve a slightly different market niche (mainline carrier, regional affiliate, and local airline), opportunities exist where the operators would not necessarily erode market share from one another. For example, the *2014 True Market-Leakage Study* showed that MLB retains the lowest number of service area passengers to the New York / Newark market. If direct non-stop service was initiated, it is unlikely that it would significantly impact the passengers carried by the other carriers to the same market via connecting flights. In other words, it would expand the service rather than replace that which is already provided.

While the New York City area also happens to be the largest origin and destination (O&D) market for Melbourne area passengers, the same case exists for other market pairs. In fact, both Delta and American have a significant presence at a number of the Top 15 O&D markets by passengers originating from the MLB area. This is a direct result of the recent industry mergers which have expanded the potential for airlines serving airports like MLB to explore new non-stop city pairs. As an example, the opportunity now exists for American to evaluate the profitability of direct flights to the Dallas/Ft. Worth International Airport (DFW) and Miami International (with its connections to South America), which was not an option for the MLB market before the American and US Airways merger.

Price – With respect to average fares, the airlines at MLB have the ability to compete head-to-head with higher enplanement airports, even those with low-cost carriers. The *2014 True Market-Leakage Study* showed the overall average fare on the Top 50 O&D markets was slightly higher at MLB than at all but one of the competing airports. The exception being Miami International which had a significantly higher average fare than any airport.

For the area's business travelers, the fare differential is not as critical as it is for the leisure travelers. Business travelers are more sensitive to the times and availability of flights than they are fares. Many are also very loyal to their frequent flyer programs and see the cost differential offset by the associated benefits of these program perks. The bigger challenge of expanding the business traveler use at MLB is providing as many flight options as possible. Schedule convenience and flexibility are critical to support the more dynamic business traveler demands; especially with respect to the

ability to accommodate changing, missed, or cancelled flights in the same day. It should be noted that MLB enjoys an exceptionally low number of delays and cancellations.

Conversely, the leisure market is more price sensitive, especially if there are multiple travelers where the cost differential for a family quickly becomes two, three, four or more times higher. For this reason alone, leisure travelers are more prone to drive to an alternate airport if a substantial cost savings or other advantage can be realized. The leisure market also includes individuals that may not use air travel frequently, and therefore, have lesser brand loyalty and concern for the frequency of flights. These traits highlight why a majority of these travelers from the MLB market often use Orlando International and other competing airports much further away. However, the average fare margins are not that high especially when the added costs of travelling to and parking at competing facilities are taken into account. As this fact continues to be promoted and the service area grows, so too will the share of leisure market served by MLB.

Customer Conveniences – By the end of this study's short-term planning period, the Ellis Road expansion and its new interchange at I-95 will be complete. This project will provide a more direct route to MLB and relieve congestion on both State Road 192 (New Haven Avenue) and State Road 518 (Eau Gallie Boulevard). While this will reduce the drive times listed in Table 3-6 to competing airports, that benefit would only be to those passengers living in the immediately vicinity of MLB. Conversely, the road improvement creates an advantage for MLB by providing greatly improved access from I-95.

According to the zip code data summarized in the *2014 True Market-Leakage Study*, many of the airport's passengers, as well as some of the employees of the numerous businesses on and around the airport, commute north from Palm Bay or south from Viera. The Ellis Road/I-95 interchange will also improve access for those passengers coming from the southern half of the two-county market area. Depending on the route, the drive time from Vero Beach to MLB ranges from 47 to 51 minutes without traffic. In either case, when coming from the south, drivers currently have to traverse a significant portion of Palm Bay or West Melbourne (depending on which exit they take) before reaching the airport area. The current drive time from Vero Beach to MCO is 1 hour and 25 minutes, via interstate highways and toll roads, with no traffic. Once the Ellis Road exit is open, the drive time from Vero Beach to MLB will be less than half of what it takes to get from Vero Beach to MCO.

3.5.6.3 Recommended Passenger Enplanement Forecast

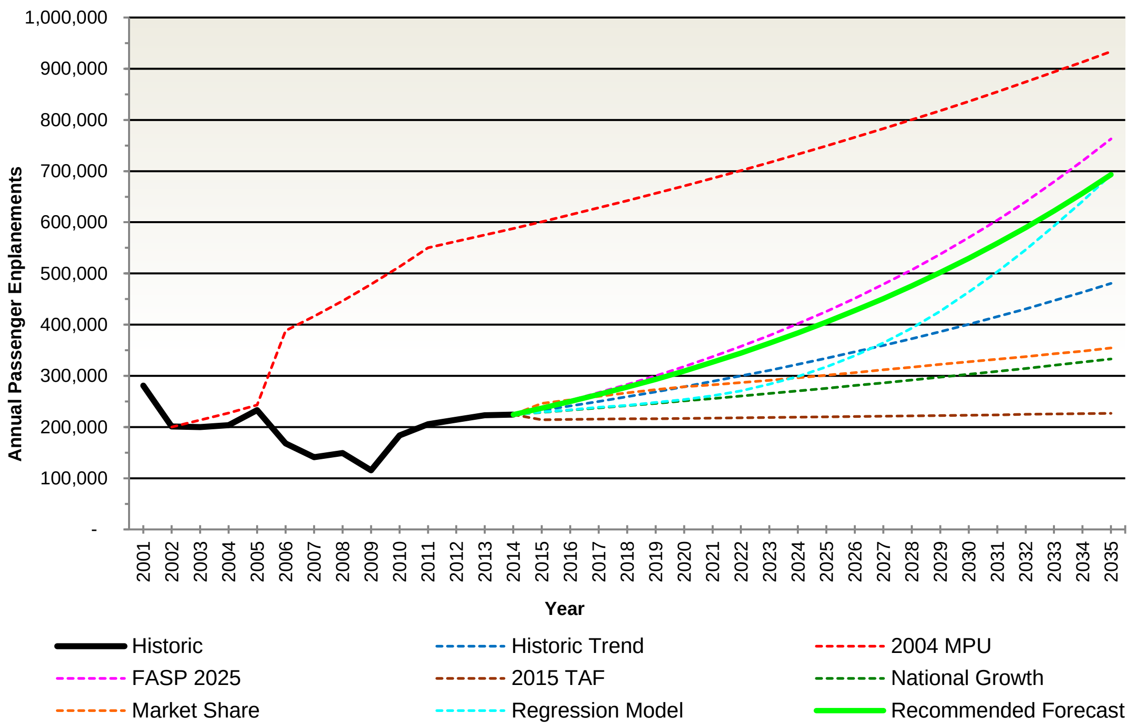
The recommended annual enplanement forecast is shown in **Table 3-11** (with the final values rounded to the nearest hundred). **Figure 3-3** depicts these projections along with those from Figure 3-2 for comparative purposes.

TABLE 3-11
RECOMMENDED PASSENGER ENPLANEMENT FORECAST

	Selected Projection
Base Year	
2014	224,260
Forecast	
2020	309,600
2025	405,000
2035	693,100
Average Annual Change	5.5%

SOURCE: ESA, 2015.

Figure 3-3: Recommended Passenger Enplanement Forecast



Source: ESA, 2015.

3.5.7 Alternative Growth Scenarios

The following sections described the two scenarios that have been developed to define the additional passenger demands that could occur beyond the recommended forecast. Both scenarios will be utilized to define planning activity levels and the related facility requirements in subsequent chapters of this Master Plan update.

3.5.7.1 International Charter Scenario

As described in Section 2.5, the passenger terminal building at MLB includes an international concourse which has dedicated facilities to process passengers either arriving from or departing to international destinations. While the airport has historically pursued different opportunities to expand international activity; MLB management has recently implemented an aggressive campaign to market this capability and attract carriers. These efforts have culminated in some significant opportunities where it is almost certain in the near-term that the airport will accommodate one or more international charter airlines, operating large aircraft. Much like the success at the Orlando-Sanford International Airport, the anticipated activity will likely serve both European and South American markets for tour operators demanding a cost effective airport for their aircraft and passenger operations into the Central Florida area.

Since this international activity is expected to occur on a regular basis, it would be in addition to the recommended enplanement growth presented in Table 3-11. Based on discussions with MLB management, it was estimated that there could be at least three weekly charter flights under this scenario by 2020, with the conservative potential to increase to five per week in 2025 and seven per week by 2035. It is envisioned that initially this service would be provided by both narrow-body Boeing 757-300 (243 seats) and wide-body Boeing 767-300ER (261 seats) commonly used for charter operations in a two-class configuration. For 2025, it is assumed that more wide-body aircraft would be used than narrow-body and only wide-body aircraft by 2035. This would include larger wide-body aircraft such as the A330-300 (300 seats) and Boeing 787-800 (291 seats) also in a two-class configuration.

To estimate the level of enplanements generated by this international charter potential, the average number of seats on each flight for each period was first calculated, based on the fleet assumptions described above. These figures were then combined with the projected average load factors for international flights from the FAA's 2014 *Aerospace Forecast*. The resulting enplanements and annual operations for the potential international charter flights are included in **Table 3-12** below.

TABLE 3-12
POTENTIAL INTERNATIONAL CHARTER ACTIVITY

	Forecast		
	2020	**2025**	**2035**
Flights per Week	3	5	7
Annual Operations	312	520	728
Average Seats Per Flight	252	266	281
Expected Average Load Factor	82.6%	82.5%	82.4%
Annual International Enplanements	32,472	57,111	84,132

SOURCE: ESA, 2015.

The total enplanement activity at MLB that would occur under the International Charter scenario is included in **Table 3-13** and depicted in **Figure 3-4**. These figures reflect the sum of the

recommended enplanement forecasts with those estimated above for the international charter potential.

3.5.7.2 High-Growth Scenario

A High-Growth scenario was also developed as a reference to help identify which portions of the airport's activities would be impacted if enplanements exceed expected levels. As discussed in Section 3.3.2, the FDOT FASP projects a 6.0 percent annual growth in MLB enplanements. While this rate is higher than that in the recommended forecast (5.5 percent), it does not generate a significantly higher level of passengers. However, an average annual rate of 7.5 percent would result in just over one million passengers by the end of the planning period. For 2020 and 2025, this growth would create an additional 36,500 and 91,900 enplanements, respectively, over the recommended forecast.

Under this scenario, the increase in domestic passenger activity reflects the potential for more frequency and new routes, including the possible return of intrastate air service. Scheduled intrastate commercial service is an important component of commercial aviation in Florida, including MLB as recently as 2009. While this service was not maintained, it is possible future intrastate routes could be reestablished at MLB, especially for those airlines operating fleets with smaller aircraft. In addition, the High-Growth scenario also factors in the potential for increased international charter activity. However, under this scenario, it is envisioned that the airport's increased level of service would facilitate and promote higher levels of international charter activity than discussed above.

Under the High-Growth scenario, it is assumed that by 2020 there would be one international charter flight each weekday and one every weekend (6 flights per week). This would then increase to nearly two every weekday and/or one every weekend (approximately 10 flights per week) by 2025. At the end of the planning period, the international charters would average two flights per day for a total of 14 each week. As described previously, it is envisioned that this increased international charter activity would initially be provided by both narrow and wide-body aircraft, eventually maturing to a predominantly wide-body fleet by the end of the planning period.

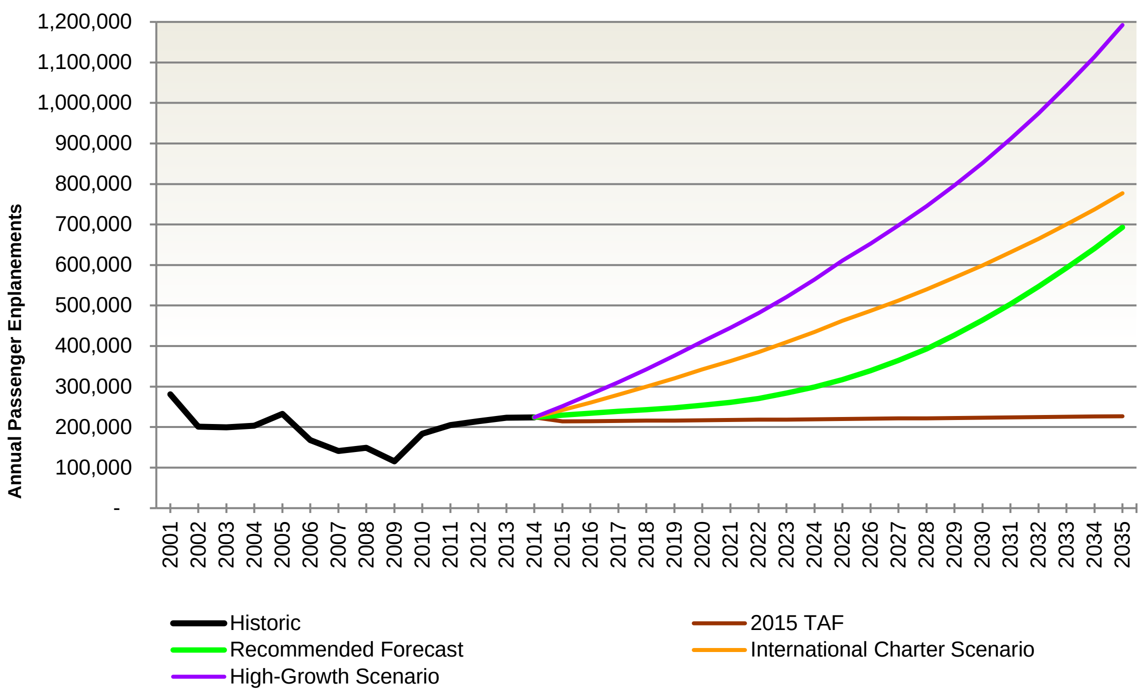
The total enplanement activity that could occur under the High-Growth scenario is shown in Table 3-13 and depicted in Figure 3-4. These figures reflect the combination of the higher base activity (7.5 percent annual growth) with that of the more frequent international charter possibility.

TABLE 3-13
ENPLANEMENT LEVELS UNDER ALTERNATIVE GROWTH SCENARIOS

	International Charter Scenario	High-Growth Scenario
Base Year		
2014	224,260	224,260
Forecast		
2020	342,100	411,100
2025	462,100	611,100
2035	777,200	1,192,300
Average Annual Change	6.1%	8.3%

SOURCE: ESA, 2015.

Figure 3-4: Recommended and Alternative Growth Enplanement Forecasts



Source: ESA, 2015.

3.6 Passenger Service Activity Forecasts

Passenger service activity consists of the aircraft operations conducted by the regularly scheduled as well as non-scheduled charter and on-demand carriers. The following sections define the type and level of commercial service aircraft operations that are expected to support the recommended

enplanement forecast, as well as the two alternative growth scenarios. The FAA defines an aircraft operation as either a single aircraft landing or a single aircraft takeoff.

3.6.1 Projections of Passenger Service Operations

The recommended passenger enplanement projection in Table 3-11 provides a starting point for the determination of future commercial passenger service operations. The FAA categorizes commercial passenger operations as either air carrier or air taxi/commuter in their various datasets, airport traffic control tower logs, and the agency's aerospace forecast. Traditionally, the FAA has defined air carrier operations as those conducted by scheduled and non-scheduled passenger carriers operating aircraft with more than 60 seats. Following this definition, the air taxi/commuter operations have included those carriers operating aircraft having 60 seats or less. However, these definitions have crossed as the industry has evolved to include larger regional aircraft with capacities in the 60 to 90-seat and higher range.

At MLB, the regularly scheduled operations by Delta and American were included in both the air carrier and air taxi/commuter categories, while flights by Elite Airways are generally included in the air taxi/commuter counts. By FAA definition, air taxi operations are commercial operations since they are "for hire" and can include non-scheduled general aviation flights, as well as scheduled airline service. However, for this analysis, all passenger service operations will be combined and based solely on the recommended projections of passenger enplanements made in the previous section.

3.6.2 Airline Fleet Mix and Load Factors

Delta Airlines presently utilizes different aircraft models from their narrow-body fleet to provide daily service between MLB and the Hartsfield-Jackson Atlanta International Airport (ATL). FlightAware™ data for the most recent year[13] and current airline schedules show Delta's primary use of the McDonnell Douglas MD-88, MD-90, Airbus A319-100, and Boeing 717-200 on this route. The data shows that Delta also occasionally makes equipment substitutions at MLB using their Airbus A320, Boeing 737, and Boeing 757 aircraft. For American, service between MLB and the Charlotte Douglas International Airport (CLT) includes a mix of the Bombardier CRJ-200 and CRJ-700 regional jets. While not on the regularly scheduled flight list, Elite Airways currently operates Bombardier CRJ-200 and CRJ-700 regional jet aircraft.

A similar mix of narrow-body and regional jet aircraft are expected to serve MLB throughout the planning period. Even as daily domestic flights are added, new routes announced, or different carriers established; the size and type of aircraft serving the airport should remain relatively the same. The future mix of aircraft was based on discussions with the current operators as well as information about their existing and future fleet intentions. For Delta, it is estimated that most of their MD-88 and MD-90 aircraft will be will be retired over the next seven to eight years. They will likely be replaced with the similar sized Airbus A320-200 and the Boeing 737-800 with continued use of the slightly smaller A319-100 and Boeing 717-200 aircraft. American has plans

[13] Flight History Report for the Melbourne International Airport. FlightAware, Inc.

to phase out their CRJ-200 aircraft, expand the use of the CRJ-700, and eventually introduce the CRJ-900 on the MLB routes. Elite Airways intends to continue use of their CRJ-200s; however, future fleet additions include mostly CRJ-700s, with the potential for larger aircraft such as the Boeing 737.

Table 3-14 summarizes the type of aircraft expected to serve MLB based on fleet and seating configuration in the respective airline fleets. It should be noted that Table 3-14 does not reflect the larger, wide-body aircraft that are occasionally operated for international charters. While these operations are expected to continue in the future, their levels under the recommended enplanement forecasts are such that they would not significantly change the average seats per departure. These aircraft are included in the calculations for the alternative scenarios, where international charters are expected to occur on a more frequent basis.

TABLE 3-14
PROJECTED CHANGE IN AIRLINE FLEET MIX AT MLB

	Base Year	Forecast Years		
	2014	**2020**	**2025**	**2035**
Seating Configuration				
160+	MD90 (160 seats)	MD90 (160 seats)	B737-800 (160 seats)	B737-800 (160 seats)
140-159	MD88 (149 seats)	MD88 (149 seats)	A320-200 (150 seats)	A320-200 (150 seats)
120-139	A319-100 (126 seats)	A319-100 (126 seats)	A319-100 (126 seats)	A319-100 (126 seats)
100-119	B717-200 (110 seats)	B717-200 (110 seats)	B717-200 (110 seats)	B717-200 (110 seats)
80-99	none	CRJ900 (80 seats)	CRJ900 (80 seats)	CRJ900 (80 seats)
51-79	CRJ700 (67 seats)	CRJ700 (67 seats)	CRJ700 (67 seats)	CRJ700 (67 seats)
50 or under	CRJ200 (50 seats)	CRJ200 (50 seats)	CRJ200 (50 seats)	none

NOTE: B737-700 (124 seats) may also be used in place of A319-100.

SOURCE: ESA, 2015.

The annual load factors for periods back to 2001 were evaluated with particular attention to those after MLB began recovering from the 2009 passenger lows. Since that time, Delta consolidated its flights into mainline only service after the discontinuation of service by their regional partner Atlantic Southeast Airlines, which later changed its name to ExpressJet. Also during that time, US Airways (now American) resumed its regional service to MLB after more than a decade.

Since 2009, each of the regional airlines serving MLB exceeded the average load factor for all regional airlines in the nation over the same period. The average load factor for Delta's mainline service is slightly below the national average for that group of airlines; however, there have been many months since 2012 in which Delta has posted much higher rates than the national averages, including many around or exceeding 90 percent. For the purposes of this study, the mainline and regional load factors have been prorated and compared to the system-wide, domestic load factors projected by the FAA. In 2014, the average load factor at MLB was 84.3 percent, which is higher than the national average of 83.5 percent for 2013. For the planning period, MLB's average was

held constant through 2020 and then increased to 84.5 percent in 2025 and 84.7 percent in 2035, matching the system-wide projections by the FAA.

Table 3-15 presents the projection of passenger service operations which initially applies the expected utilization of aircraft with their corresponding seating configurations (from Table 3-14) to calculate average seats per departure. The percentages shown for the base year fleet utilization were derived from the recent FlightAware data for MLB. Future utilization is based on the fleet composition projected in Table 3-14 and the assumption that the share between mainline and regional aircraft will remain relatively the same. These estimates result in a slight decrease in the overall average seats per departure by 2020. This reflects anticipated adjustments in the size of aircraft utilized as some additional frequency and/or new routes are also expected to be established during this period. The average seats per departure then increase for the rest of the planning period, which would reflect the increased level of passengers and maturity of established market pairs through 2035.

To estimate annual passenger aircraft operations, load factors were applied to the average seats per departure to calculate the enplanements per departure. This figure could then be divided into the expected level of enplanements to derive annual departures, which is simply doubled for the projected passenger service operations. Table 3-15 also includes the average daily departures to provide a reference for the changes expected over the planning period.

TABLE 3-15
EXPECTED FLEET UTILIZATION AND PASSENGER SERVICE OPERATIONS

	Base Year	Forecast Years		
	2014	**2020**	**2025**	**2035**
Fleet Utilization (based on seating configuration)				
160+	9%	8%	8%	8%
140-159	42%	35%	35%	35%
120-139	2%	3%	4%	4%
100-119	2%	2%	2%	3%
80-99	0%	10%	15%	20%
51-79	29%	35%	33%	30%
50 or under	16%	7%	3%	0%
Total	100%	100%	100%	100%
Average Seats per Departure	109	106	107	110
Boarding Load Factor	84.3%	84.3%	84.5%	84.7%
Enplanements per Departure	92	89	90	93
Enplanements	224,260	309,600	405,000	693,100
Annual Departures	2,438	3,469	4,496	7,459
Annual Operations	4,875[a]	6,937	8,991	14,919
Average Daily Departures	7	10	12	20

[a] Estimate derived from methodology. Actually 5,010 passenger service operations in 2014.

SOURCE: ESA, 2015.

There were 5,092 annual operations in the most recent FlightAware data from which the fleet utilization percentages were derived. Even after applying averages for seating configurations and load factors, the 2014 calculation of 4,875 is within 4.3 percent of the FlightAware count. The calculation is also within 2.7 percent of the 5,010 passenger service operations associated with the 224,260 level of enplanements reported in MLB's monthly management reports. These differences are attributed to the fact that some of the activity in the different reports was probably generated by non-scheduled passenger operations.

3.6.3 Activity Levels under the Alternative Growth Scenarios

The same calculations were made using the enplanements levels projected under the International Charter and High-Growth scenarios. For both, the airline fleet mix was adjusted to include the anticipated narrow-body (Boeing 757-300) and wide-body (Boeing 767-300ER, Airbus A330-300, and Boeing 787-800) aircraft typical of many international charter carriers. Additionally, the assumption for the average load factors was modified. For both alternative growth scenarios, average load factors were reduced slightly to reflect the lower levels that may result from establishing additional frequency, new domestic routes, and new international routes (from the charter activity). This adjustment was made in addition to the previous assumption associated with the recommended enplanement levels that the average seats per departure would decrease between 2014 and 2020 in response to the carriers making adjustments for additional frequency on existing routes and the possibility of new domestic market pairs. For the alternative growth scenarios, the FAA's projections for the combined domestic and international load factors were applied. These system-wide levels are 83.6 percent for 2020 and 83.8 percent for both 2025 and 2035. The resulting passenger service operations and daily departures are included in **Table 3-16**.

TABLE 3-16
ACTIVITY LEVELS UNDER ALTERNATIVE GROWTH SCENARIOS

	Forecast		
	2020	**2025**	**2035**
International Charter Scenario			
Average Seats per Departure	113	114	117
Boarding Load Factor	83.6%	83.8%	83.8%
Enplanements per Departure	94	96	98
Enplanements	342,100	462,100	777,200
Annual Departures	3,635	4,838	7,928
Annual Operations	7,271	9,677	15,856
Average Daily Departures	10	13	22
High-Growth Scenario			
Average Seats per Departure	116	118	121
Boarding Load Factor	83.6%	83.8%	83.8%
Enplanements per Departure	97	99	102
Enplanements	411,100	611,100	1,192,300
Annual Departures	4,230	6,183	11,733
Annual Operations	8,459	12,365	23,467
Average Daily Departures	12	17	32

SOURCE: ESA, 2015.

3.7 Air Cargo Projections

Commercial air cargo is generally split into the freight handled by passenger airlines and the activity conducted by dedicated all-cargo carriers. Some amount of freight, typically in the form of small parcels, is carried in the bellies of most of the passenger airline aircraft arriving to or departing from MLB. And while currently there are no regularly scheduled all-cargo flights at MLB, there are large dedicated air cargo flights associated with local aerospace and defense contractors. There is also smaller cargo carried by general aviation aircraft via air taxi, air charter, or for-hire operators.

3.7.1 Passenger Airline Cargo Volumes

The historic enplaned and deplaned cargo volumes carried by the passenger airlines at MLB have pretty much tracked with national trends. Over the past decade, the total cargo carried by MLB airlines declined each year between 2004 and 2009, to a low of 122,600 pounds. As with passenger enplanements, these cargo levels then increased each year after 2009 to the 267,900 pounds carried in 2014. It is interesting to note that of the total cargo amounts carried by the airlines at MLB, two thirds have been enplaned and one third deplaned.

The FAA does not evaluate the enplaned versus deplaned cargo levels at the national level. Rather, the industry measure of revenue ton miles (RTMs) is used to document and project trends associated with the all-cargo carrier and passenger airline cargo activity. In the FAA 2014 Aerospace Forecast, the agency projects that domestic cargo carried by the passenger airlines will only increase 0.6 percent each year. This rate has been used to estimate the future cargo levels carried by the passenger airlines at MLB (**Table 3-17**).

Frequently, the growth in passenger service operations is applied to forecast future belly-haul cargo levels. For MLB, that growth is 5.3 percent each year and has been employed to create the High-Growth scenario also shown in Table 3-17. While it can certainly be argued that more passenger aircraft will create additional belly-haul capacity, the lower rate for the selected projection is based on specific industry observations. The 2014 Aerospace Forecast documents how the all-cargo carriers have increased their share of domestic cargo RTMs from 70.1 percent in 2000 to 88.8 percent in 2013. Reasons for this shift include:

- air cargo security restrictions put in place by FAA and Transportation Security Administration
- the shift of air cargo to ground modes of transportation (primarily trucking but also some rail)
- the use of contract all-cargo carriers for more time sensitive U.S. Postal Service mail
- increase in the use of e-mail, cloud computing, and other substitutes to traditional mail
- changes in passenger airline structures including airline consolidations, reduction of routes, and higher passenger load factors.

This shift is expected to continue, with the FAA projecting that 90.4 percent of the domestic cargo RTMs will be handled by all-cargo carriers by 2034. The application of the lower growth rate for

MLB is also based on the fact that the airport's passenger airline fleet includes a significant mix of regional jet aircraft. While these aircraft are getting larger, most models have only a modest capacity for cargo if operated at the higher passenger load factors (with the corresponding baggage). Historically, most of the passenger belly-haul cargo at MLB has been carried by narrow-body aircraft, which only makes up approximately half of the airline operations at the airport.

TABLE 3-17
SELECTED AIR CARGO FORECASTS

	Recommended Projections		High-Growth Scenarios	
	Total Passenger Airline Cargo	**Dedicated All-Cargo Carrier Operations**	**Total Passenger Airline Cargo**	**Dedicated All-Cargo Carrier Operations**
Base Year				
2014	267,900 lbs.	0	267,900 lbs.	0
Forecast				
2020	277,700 lbs.	208	365,900 lbs.	312
2025	286,200 lbs.	231	474,500 lbs.	385
2035	303,800 lbs.	284	797,800 lbs.	587
Average Annual Change	0.6%	2.1%	5.3%	4.3%

SOURCE: ESA, 2015.

3.7.2 All-Cargo Carrier Potential

Although MLB does not currently have regularly scheduled air cargo operations, there are some factors that could generate such activity in the future. Current plans for continued expansion of Embraer's aircraft assembly lines, increasing aircraft maintenance activity by MRO operators, Discovery Aviation's aircraft manufacturing operation, and other airport area businesses have increased the need for a reliable, "just in time" supply chain network. While there are certainly many competitors to provide this service, as the airport businesses expand and mature, there is the unique opportunity for one or more dedicated air freight forwarding operation to be established.

It is uncertain what the level of dedicated all-cargo operation might be for MLB in the future. While there is certainly the potential described above, the airport is continuously pursuing new opportunities that might develop a significant all-cargo demand virtually overnight. Since there are so many unknowns associated with this potential, for planning purposes, it is conservatively estimated that that two flights per week (208 annual operations) would occur by 2020. The size and type of aircraft is difficult to predict as the various needs of on-airport and local businesses could vary significantly. The FAA projects both domestic and international all-cargo carrier RTMs, using the nation's economy (primarily the gross domestic product), as well as other factors such as fuel prices and trends in world trade. For the projection of all-cargo operations at MLB, Brevard County's Gross Regional Product data was utilized, which was projected by Woods and Poole to increase 2.1 percent each year through 2035. This results in 284 annual all-cargo operations by the end of the planning period (Table 3-17), approximately three all-cargo flights per week.

The FAA's total growth (domestic and international) all-cargo RTMs of 4.3 percent annually was applied to generate a High-Growth scenario as it is possible that many components may originate or be sent to foreign destinations. The capability associated with the airport's Foreign Trade Zone could also drive additional all-cargo demand, so it was assumed that there would be three flights a week (312 annual operations) by 2020 under the High-Growth scenario. The High-Growth scenario reflects 587 annual all-cargo operations by 2035, approximately six flights per week.

3.7.3 Military Cargo Activity

As mentioned previously, MLB accommodates unscheduled dedicated air cargo activity, primarily in support of the aerospace and defense contractors located at and in the vicinity of MLB. This is usually conducted by large aircraft up to and including the Boeing 747 and Antonov cargo models. However, because of the nature of this activity the flights and payload weights are not typically recorded as specific cargo operations at MLB. Rather, most either fall within the general aviation or military activity counts. As such, there is no way to reliably project how this activity may increase in the future.

3.8 General Aviation Activity Forecasts

There are many elements categorized within the broad definition of general aviation. As described previously, it includes all segments of the aviation industry with the exception of commercial service carriers and the military. The following sections address the general aviation activity occurring at MLB.

3.8.1 Based Aircraft

The number of aircraft owners projected to base their aircraft at MLB is an important consideration when planning general aviation facilities and is used to discern likely future needs for aircraft storage buildings and apron space. Projections of based aircraft also provide an indication of the anticipated growth in general aviation activity that might occur at MLB. According to the most current Airport Master Record (FAA Form 5010-1), there were 235 aircraft based at MLB in 2014. The FAA 5010 data is updated each year as part of the airport's annual Federal Aviation Regulation (FAR) Part 139 inspection. This is also the source data for information used in the FDOT's system plan forecasts and the FAA TAF.

3.8.1.1 Historic Growth

Because the general aviation industry is cyclical in nature, it is important to analyze the overall changes that have occurred at the airport. Despite the challenges the industry has faced over the last decade, there has been an overall increase in the number of based aircraft at MLB between 2001 and 2014. The average annual growth for this period was used to create one forecast option. When applied to the current level of based aircraft, the historic average annual growth of **2.7** percent results in **412** based aircraft by 2035.

3.8.1.2 Previous Growth Projections

Based aircraft projections from the 2004 Master Plan had an overall growth of **2.1** percent through 2021. This projection, which was actually based on Florida's statewide system plan at that time, ended up a little conservative predicting 218 based aircraft by 2014 versus the actual count of **235**. However, given this estimate was within the long-term portion of the forecast, the prediction was relatively accurate.

As mentioned, the Florida Aviation System Plan is updated each year, and therefore incorporates changes in the industry that can ultimately affect the level of based aircraft. The most recent data for the system plan uses 2013 as a base year and projects an average annual compounded growth of **1.7** percent each year or **340** based aircraft by 2035.

Projections from the 2015 TAF also have 2013 as a base year but reflect the FAA's outlook given the various indices and expectations they analyze for the industry. The current TAF projects an average growth rate of **2.6** percent, nearly identical to the historic trend and therefore resulting in a similar level of based aircraft (**414**) by 2035.

3.8.1.3 National Active Fleet Forecasts

Every year, the nation's active general aviation fleet is published as part of the FAA's Aerospace Forecast. Despite decreases in the total active fleet since 2007, the FAA expects this trend to reverse, projecting positive growth from 2013 through 2034. The assumptions supporting the turn towards growth is reasonable as new shipments of general aviation aircraft in the U.S. have increased annually since 2011. The conservative growth (**0.5** percent annually) for the national active fleet was applied to the present number of based aircraft at MLB, which generated a forecast of **261** based aircraft at MLB by 2035.

3.8.1.4 Recommended Based Aircraft Forecast

MLB has continuously been supported by the Airport Authority, FDOT, and FAA. This is an important observation to make as it has a direct impact on the ability to improve general aviation facilities and services available to existing and new users of the airport. This support has helped ensure continued growth, even during difficult times, which should be taken into consideration when evaluating the different projections summarized in **Table 3-18**.

This is not to say the airport has been insulated from the various ups and downs of the general aviation industry, or the economy for that matter. In fact, since the low of 166 based aircraft in 2001, the numbers fluctuated up and down until they reached a high of 269 based aircraft in 2008. Since then, the level has receded to the current count of 235 in 2014. Almost all of the losses were from the single-engine aircraft category, but also included a few multi-engine aircraft. As documented by the FAA, such decreases in the single and multi-engine piston fleet has been a nationwide trend over the last decade. As witnessed at MLB, this national decline continued beyond the end of the 2008 recession as aging aircraft in this category were either sold or not utilized due to the cost of operation. In addition, small aircraft owners are usually more sensitive to pricing and may relocate their aircraft to another airport if a less expensive opportunity (i.e., lower T-hangar rent) presents itself. However, MLB T-hangar rentals are competitively priced.

While the growth projected by the FAA for the nation's active general aviation fleet is a reasonable forecast for its intended purpose, it is not considered realistic for MLB. Based on MAA's support of the general aviation community, 100 percent hangar occupancy at MLB, current demand for additional hangar facilities, and the area's sound economy, it stands to reason the MLB has the potential to regain previous based aircraft levels and even surpass them over the course of the 20-year planning period. Conversely, the 2015 FAA TAF, as well as the historic trend analysis, result in based aircraft projections of more than 400 aircraft towards the end of the planning period. Even though the historic growth projection incorporates local tendencies and demand is continually expressed for additional facilities by the airport tenants, this level of growth is not fully justified at this time.

TABLE 3-18
COMPARISON OF BASED AIRCRAFT PROJECTIONS

	Historic Growth	Florida Aviation System Plan (FASP)	2015 FAA TAF	National Active Fleet	Recommended Forecast
Base Year					
2014	235	235[a]	235[a]	235	235
Forecast					
2020	276	264	275	242	270
2025	315	288	313	248	302
2035	412	340	414	261	376
Average Annual Increase	2.7%	1.7%	2.6%	0.5%	2.3%

[a] Actual base year of 2013.

SOURCE: ESA, 2015.

For the selected based aircraft projection, an average of the historic growth rate and that projected by the FDOT FASP was adopted. This balances what can reasonably be expected given local conditions, while at the same time incorporating elements from the regional perspective. MLB is within the East Central Florida region of the FASP, which is the second most populated of the nine regions and includes 21 other competing airports. As described, use of the FASP's growth rate in the last master plan resulted in fairly accurate based aircraft figures for the second half of that study's 20-year planning period. In essence, the slightly conservative FASP projection has been included to temper the historic growth to what is believed to be a more probable projection of **2.3** percent annual growth for a total of **376** based aircraft by 2035.

The historic growth projection is considered a High-Growth scenario with respect to the future level of based aircraft that could be realized. It was selected over the FAA TAF as it has the higher average annual growth, resulting in slightly more aircraft in 2020 and 2025. Interestingly, the FAA TAF ends up projecting a few more based aircraft in 2035 since its average annual growth rate is first applied to the 2013 base year.

3.8.2 Forecast of Based Aircraft Fleet Mix

Projecting the types of based aircraft is necessary since different aircraft types and sizes require different facilities. In general, the future based aircraft fleet mix was determined by studying the projections of the national fleet and making comparisons to the historic types at MLB. While the overall growth in the nation's active fleet was not utilized to forecast based aircraft, the individual projections of aircraft types are very useful in predicting the future types of based aircraft expected.

3.8.2.1 The Nation's Active General Aviation Fleet

The FAA's 2014 *Aerospace Forecast* shows there were 202,865 active general aviation aircraft in the United States in 2013, which is the lowest number since 2000. However, by 2034, the FAA predicts this number to increase to 225,700 aircraft.

The FAA includes nine different aircraft categories in its forecast, which for the purpose of this study have been simplified into the five categories listed in **Table 3-19**. Within the single-engine grouping is the single-engine piston, experimental, and light sport aircraft categories. The multi-engine group contains both piston and turboprop models as the rotorcraft group contains both piston and turbine models. The jet category covers all ranges of turbojet general aviation aircraft, from the very light jets to the heaviest business jets.

The FAA projects a noticeable increase in the use of jet aircraft as there are several reasons which support this anticipated growth (and Embraer's success and expansion of their production facilities at MLB). Most important is the economic recovery that has occurred after the use of business aircraft declined significantly during and after the 2008 recession. In recent years, corporate jet use has rebounded. In addition, the overall corporate jet industry continues to grow as various charter, lease, time-share, partnership, and fractional ownership agreements demand more aircraft and obtain higher utilization rates. The expansion of the different model lines and advances in product offerings have also helped revitalize corporate aviation as an efficient and accepted form of business transportation.

TABLE 3-19
FAA FORECAST OF NATIONAL ACTIVE GA FLEET

	2013 Fleet Mix	2034 Fleet Mix	Average Annual Growth Rate
Single-Engine	74.5%	67.9%	0.1%
Multi-Engine (piston & turboprop)	12.0%	12.1%	0.5%
Jet	5.9%	9.8%	3.0%
Rotorcraft	5.1%	7.9%	2.6%
Other (gliders, balloons, etc.)	2.5%	2.3%	0.2%

SOURCE: FAA 2104 Aerospace Forecast. Adapted by ESA.

The renewed popularity of travel by general aviation aircraft is also due to the ability to use smaller, less-congested airports located closer to the final destination. A large part of this is due to the expanded application of GPS technologies in navigation, but more specifically the myriad of new runway specific instrument approach procedures that have been established at even the smallest airports.

In the FAA's projections, jet aircraft are expected to replace a number of the piston aircraft in the future, including those in the multi-engine group. Hence a primary reason why both single and multi-engine groups show little overall growth while jets are expected to represent nearly ten percent of the active general aviation fleet by 2034. It should be noted that while growth is shown in the single-engine category, the individual projection for traditional single-engine piston aircraft decreases each year by 0.4 percent. The growth in this general grouping is actually from the expected increases in both experimental and light sport aircraft.

3.8.2.2 Current and Future Based Aircraft Fleet Mix

The current based aircraft at MLB is 71.1 percent single-engine, 19.1 percent multi-engine, 6.8 percent jet, 2.6 percent rotorcraft, and 0.4 percent other. When historic data is compared to the projections in **Table 3-20**, MLB had a higher percentage of multi-engine and jet aircraft than the national fleet. This does not imply a lack of single-engine aircraft or even rotorcraft at MLB. In fact, it is important to point out that nearly one-fourth of the single-engine aircraft at MLB are operated by the Florida Institute of Technology's School of Aeronautics (FIT Aviation). FIT Aviation also has six multi-engine aircraft in their current training fleet.

Throughout the planning period, the mix of aircraft is expected to remain predominately single-engine (including a few experimental and light sport aircraft). The more significant changes are the number of jet and rotorcraft expected to be based at the airport. This is reasonable considering that the FAA has predicted that turbojet technology is at the point where it is truly feasible as a replacement to the more traditional piston or turboprop fleet. Likewise, due to its flexibility, utilization, and popularity, additional rotorcraft are expected.

TABLE 3-20
FORECAST OF BASED AIRCRAFT FLEET MIX

	Base Year	Forecast Years		
	2014	**2020**	**2025**	**2035**
Single-Engine	167	181	191	226
Multi-Engine (piston & turboprop)	45	54	63	75
Jet	16	24	33	45
Rotorcraft	6	10	14	29
Other (military)	1	1	1	1
Total	**235**	**270**	**302**	**376**

SOURCE: FAA Form 5010-1 (current fleet mix); ESA, 2015.

As with most airports, the single and multi-engine categories are predominantly comprised of Beech, Cessna, Mooney, and Piper models. Likewise, the multi-engine aircraft tend to include the Beech King Air series; Cessna models, such as the 414 Chancellor; or Piper Seminole aircraft. As indicated previously, the national fleet of single-and multi-engine is anticipated to only grow slightly in the future. Thus, by the end of the planning period, the share of single and multi-engine aircraft is expected to decrease, although the actual number of these aircraft increases. While the additional single-engine aircraft are expected to be similar to those currently at MLB, additional aircraft in the multi-engine category are expected to be mostly turboprops.

Based jets will continue to include the small to medium-sized business jet aircraft, including popular models from the Embraer, Bombardier Learjet, Cessna Citation, and Dassault Falcon series. Likewise, based jets will include the larger models from the Beechcraft Hawker, Bombardier Challenger, Dassault Falcon, and Gulfstream series. Rotorcraft will continue to include both piston and turbine powered models, such as the popular Bell, Eurocopter, and Robinson models.

It should be noted that the one based aircraft for 2014 in the “Other” category is a US Air Force E-8C associated with the Joint Surveillance Target Attack Radar System (STARS) program. Since 2000, Northrop Grumman has provided sustainment services for the Joint STARS fleet and therefore, typically one E-8C is usually located at MLB. As shown, this based aircraft was held constant throughout the planning period.

3.8.3 General Aviation Operations

As described previously, the FAA defines an aircraft operation as either a single aircraft landing or takeoff. Operations are also divided into the categories of local or itinerant. Local operations are those arrivals or departures performed by aircraft that remain in the airport traffic pattern or are within sight of the airport traffic control tower (ATCT). Local operations are most often associated with training activity and flight instruction. Itinerant operations are arrivals or departures other than local operations, performed by either based or transient aircraft. Itinerant operations are generated by a wide range of recreational, business/corporate, and air charter/taxi flights.

Flight training activities make up a significant portion of the itinerant operations at MLB. FIT Aviation conducts both local and itinerant flight training operations. This includes a number of touch and go training procedures, which the FAA defines as two local operations (one arrival and one departure).

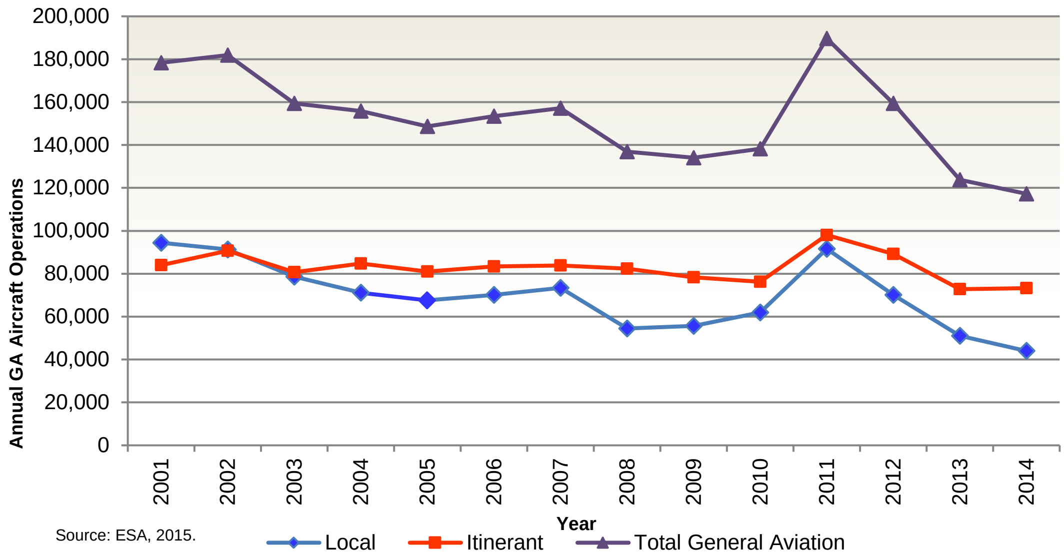
3.8.3.1 Historic Activity

Table 3-1 showed how the total annual operations at MLB have fluctuated since 2001. The same observations can be made for the general aviation activity as it averaged 95 percent of MLB’s total operations for the same period. The split between the local and itinerant general aviation activity has an equally varied history as illustrated in **Figure 3-5**.

When looking over the historic data, the element that stands out is how quickly the general aviation aircraft operations can increase or decrease at MLB. While activity is directly linked to the

economy (and was affected by the 2008 recession), local operations also reveal that a lot of the highs and lows are related to the flight training activity. This was confirmed during discussions with the management of FIT Aviation, as they do experience variations in the timing of their various flight programs. In general, while FIT Aviation has its core flight training related to the four-year degree programs, they also offer flight training to other entities (i.e., specific training contracts). The contracted flight training might commence, overlap, or conclude in a relatively short period of time. As different contract training programs ended between 2012 and 2013, the utilization of FIT's fleet of 43 aircraft decreased from 60,000 annual hours to the present level of approximately 25,000 hours. This has been a key component of the recent declines, but as witnessed between 2010 and 2011, the opposite can occur literally overnight.

Figure 3-5: Historic General Aviation Operations at MLB



Source: ESA, 2015.

Flight training also generates a number of itinerant operations, but it is harder to pinpoint specific impacts to any declines given other activity at the airport. Once a student is beyond the primary phases of flight training, typical flights will include leaving the MLB airspace to conduct cross country flights, practice different instrument approach procedures, and/or conduct touch and go operations at other airports. For the other itinerant operations, interviews with the MLB's Fixed-Base Operators (FBOs) indicate that their fuel sales and overall activity have been increasing, specifically by customers operating large multi-engine and jet aircraft operators. Two of the FBOs stated a desire to expand their aircraft apron and hangar storage space beyond their current leaseholds. This need was identified as necessary to meet existing demand and to support the growing FBO business, air charter/taxi operations, and aircraft maintenance services at MLB. Unfortunately, recent historic activity cannot be utilized to create a future projection of general aviation aircraft operations as only a continued decrease in activity would result.

The assembly and production of aircraft at MLB also generates general aviation aircraft operations at the airport. For example, Embraer's flight testing of the Phenom 100 and Phenom 300 aircraft

assembled at MLB typically consists of one check flight (two operations) per aircraft. The expansion of assembly facilities to produce the Legacy 500 jet aircraft would more than double the number of Embraer's check flight operations at MLB by the end of 2016.

3.8.3.2 Previous Growth Projections

General aviation operations in the 2004 Master Plan were projected to have an average growth rate of 2.0 percent over the 20-year planning period. In hindsight, this resulted in a relatively high forecast as there were over 176,000 general aviation operations in the base year (2001) of that forecast, which was not sustained.

Projections of the general aviation operations in the FDOT's FASP benefit from being updated on an annual basis. Not only does this factor in recent industry fluctuations, it also allows adjustments to be made for the individual airports to accommodate local or regional changes (i.e., assembly and delivery of Embraer business jet aircraft at MLB). The most recent system plan forecast has 2013 as the base year and, therefore, captures the substantial decline in general aviation operations experienced at MLB after 2011. Regardless, general aviation operations are projected by FDOT to recover and grow approximately 2.0 percent each year. This rate has been applied to the current base year level (Table 3-20) to provide an updated projection based on the FASP forecast.

The general aviation operations data in the FAA 2015 TAF also has 2013 for the base year. Therefore, it too incorporates the recent declines; however, the biggest drop was shown to occur in 2012 as the TAF is based on the FAA's fiscal year. This drop, as well as others in the historic data for MLB, is likely a large part of the relatively flat projection in the TAF, with only 0.3 percent growth each year. Applying this growth to the current calendar year data (2014) creates a projection that can be compared with the others.

3.8.3.3 Utilization of the General Aviation Fleet

Historic data and projections on the number of hours flown by general aviation aircraft is another element of the FAA 2014 Aerospace Forecast. The FAA anticipates the utilization of the fleet to increase at an average annual rate of 1.4 percent between 2013 and 2034. There are two assumptions within the FAA projection that directly relate to MLB.

First, the total number of single and multi-engine piston aircraft in the nation's active fleet is anticipated to decline, but the utilization rate of those remaining will increase. Tied to this is the FAA's belief that the average age of the remaining fleet will be lower. This parallels FIT Aviation's goal to increase utilization of what they consider to be their very young fleet of both single and multi-engine piston aircraft. The second is that the turbine fleet (including rotorcraft), which already tend to have a high utilization rate, are expected to lead the growth in the overall fleet for the next 20 years. The information obtained from MLB's FBOs confirms that their businesses have centered on and will expand from the larger turboprop, jet, and rotorcraft activity. In addition, Embraer is constructing additional facilities that will more than double their turbojet production rate at MLB in 2016.

Based on the above, just over 157,000 operations would occur by the end of the planning period (**Table 3-21**) when the FAA's expected growth for utilization is applied to present levels of general aviation activity at MLB.

3.8.3.4 Market Share

A market share analysis was conducted to evaluate the portion of the nation's general aviation activity that occurs at MLB. The combined operations for every airport in the nation, with either a FAA or FAA contract tower, are included in the FAA's Aerospace Forecast. This data includes subsets for the different reporting categories used by the FAA. The airport and national data was compared to calculate the historic portion of general aviation operations conducted at MLB each year.

Particular attention was given to the individual annual shares between 2008 and 2013 as this included the airport's highest and lowest contributions to the national totals. In terms of annual operations, MLB's contract tower went from the 12th busiest in the nation in 2008, to the busiest in 2011, and then back down to the 9th busiest in 2013. The change in market share during this cycle was used to project future levels, which were then applied to the FAA's national forecast. This analysis showed that in 2035 nearly 216,000 of the nation's 28.8 million general aviation operations would be conducted at MLB.

TABLE 3-21
COMPARISON OF PROJECTIONS FOR GENERAL AVIATION OPERATIONS

	State System Plan Growth	2015 FAA TAF Growth	Utilization of National Fleet	Market Share Analysis
Base Year				
2014	117,252	117,252	117,252	117,252
Forecast				
2020	132,045	119,378	127,452	148,589
2025	144,788	121,180	136,627	168,219
2035	177,715	124,865	157,006	215,997
Average Annual Change	2.0%	0.3%	1.4%	3.0%

SOURCE: ESA, 2015.

3.8.3.5 Regression Analysis

The use of regression analysis to forecast general aviation operations at MLB was not conducted for this study as a majority of general aviation activity at the airport is related to flight training. In this case, little of the socioeconomic data available was considered to be applicable and was not expected to reasonably explain the historic variations or reasonably project future activity.

3.8.3.6 Recommended Forecast of General Aviation Operations

Each of the projections shown in Table 3-21 were generated using commonly accepted methods. Therefore, selection of a preferred forecast largely depends on the potential of the airport's general aviation users and the associated assumptions on future airport activity. While there were substantial decreases in the overall activity during the historic period, nearly identical variations occurred on the national level. During the market share analysis, review of the nation's general aviation operations revealed an overall decrease of 31.4 percent between 2001 and 2013. For MLB, the overall loss for the same period equated to 30.6 percent.

A reasonable forecast for the 20-year planning period would identify and incorporate these impacts while at the same time considers future opportunities. A lot of the potential for future activity rests with FIT Aviation as evidenced from historical data. In 2011, FIT Aviation had the highest utilization of their fleet (60,000 hours flown) and MLB the busiest FAA contract tower in the nation. Conversely, the nation posted its lowest level of total general aviation operations in 2011 according to the FAA. Since then, FIT Aviation's utilization rates, the activity at MLB, and general aviation operations for the nation have decreased a bit more. Conversely, the FBOs at MLB have remained busy, predominately serving the larger general aviation aircraft; have had increasing fuel sales; and are looking to expand their facilities and services. As noted previously, Embraer is expanding its assembly facilities that will more than double its production of jet aircraft at MLB by the end of 2016.

Given the nature of operating a flight school, FIT Aviation will likely experience additional fluctuations over the course of the planning period. Unfortunately, as with most airports, there are no specific counts made of flight training activity. However, information on FIT Aviation's aircraft utilization during different periods was used to estimate the related level of operations. During the peak activity in 2011, the 60,000 hours accrued by FIT's aircraft was also a peak for their fleet at that time. A year later, there was a decrease of approximately 30,000 general aviation operations at MLB and FIT had a corresponding decrease of approximately 25,000 hours. Between 2012 and 2014, operations decreased another 42,000 while FIT Aviation's fleet lost 35,000 hours.

When these two periods are considered, it is safe to assume that a one-hour change in FIT Aviation's aircraft utilization roughly equates to one operation at MLB. While the number is actually around 1.2, there are certainly other operations and factors that contributed to the changes in the periods noted. The key here is that in 2014, FIT Aviation's aircraft only accrued 25,000 hours with a fleet capable of conducting 45,000 hours each year. In February of 2015, FIT Aviation's representatives indicated that they have a number of pursuits that could quickly increase the current utilization of their aircraft from 25,000 hours back up to 45,000 hours. Therefore, at any given time in the short-term planning period, it is possible that an increase of 20,000 annual operations could be realized with the start of one or more contract flight programs by the university.

When this latent demand is coupled with the significance of the FBO operations and the expanding local population, businesses, and overall economy, MLB would be best served by a forecast that accommodates this potential to be of value with respect to facility planning. Only the market share forecast has the ability to recognize this growth potential given that it essentially creates a

performance index between MLB and all other airports with an ATCT in the nation. It is also considered to be more specific to the actual activity occurring at Melbourne under the current operating environment. In fact, the projection could prove somewhat conservative if FIT Aviation generates an additional 20,000 operations over the next couple of years. While this projection has a higher growth rate in the near-term due to the FAA's national expectations, there are only another 31,000 annual operations projected between 2014 and 2020. Likewise, the peak activity level experienced in 2011 would not be realized again until 2030 under this forecast. Regardless, the market share analysis is considered to be the most specific and dependable estimate and has been selected for use in the rest of this study.

In developing a High-Growth scenario, the base assumption was that FIT could generate an additional 20,000 annual operations as early as 2016. Therefore, this projection utilized 137,252 annual operations in 2016 as the base year. The activity was then increased annually at growth rate of 4.0 percent. This is the initial growth rate (between 2014 and 2020) that was derived in the market share analysis. In the market share projection, the average annual growth then slows after 2020 based on the FAA's long-term projection of operations at all towered airports. For the High-Growth scenario, the 4.0 percent annual growth rate was applied throughout, resulting in 289,200 operations by 2035. When compared to the activity level in 2014, this creates an overall average annual growth rate of 4.4 percent.

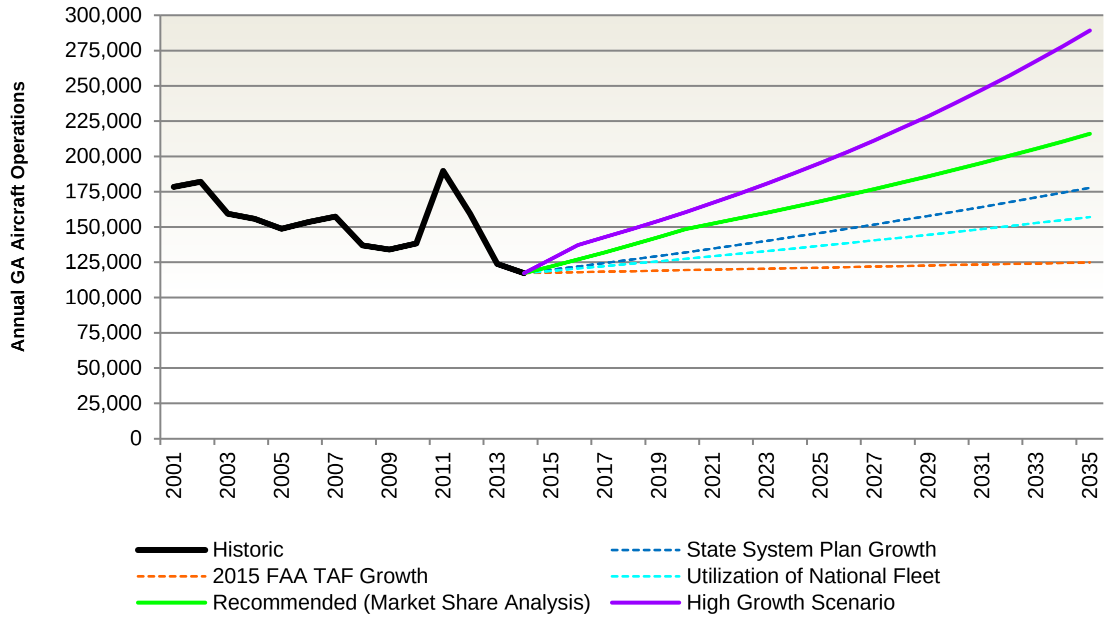
The recommended general aviation forecast and High-Growth scenario are included in **Table 3-22** and illustrated on **Figure 3-6** along with the other projections for comparison.

TABLE 3-22
SELECTED FORECASTS OF GENERAL AVIATION OPERATIONS

	Recommended Projection (Market Share Analysis)	High-Growth Scenario
Base Year		
2014	117,252	117,252
Forecast		
2020	148,589	160,565
2025	168,219	195,352
2035	215,997	289,169
Average Annual Change	3.0%	4.4%

SOURCE: ESA, 2015.

Figure 3-6: Selected General Aviation Operations Forecasts



Source: ESA, 2015.

3.9 Military Activity Forecasts

Military operations are those conducted by aircraft from one of the U.S. military service branches. While there are no military aviation units based at MLB, the airport and surrounding area is home to a number of military contractors. One U.S. Air Force Joint STARS E-8C is typically based at Northrop Grumman's facilities at any given time. As such, both local and itinerant military operations have been recorded, but have only averaged about 800 operations annually since 2001. This military activity has averaged 80 percent local and 20 percent itinerant, which reflects the higher occurrence of airport area test flights and training related to the military contract work.

The ability to accurately forecast operations at a military air base is complicated by a number of facts. This is even more difficult for the activity at a public airport like MLB. Essentially operational levels can fluctuate year to year as they are dependent on unpredictable variables such as annual defense budgets, national security threats, global military needs, and even natural disasters. One element that may foster some additional growth is the newer Department of Defense fueling service contract held by one of the FBOs. This relatively new, five-year contract has the potential to generate additional stops by military aircraft, but again the level is difficult to predict.

As with the last master plan, future activity by military aircraft has been held constant at 1,000 annual operations. In consideration of a High-Growth scenario, this level has been increased to 1,500 annual operations. This roughly translates into one extra military flight per weekday, which could represent an overall increase in military contractor activity and/or additional flights from the military fuel contract. In both cases, it is assumed that the 80 percent local and 20 percent itinerant split would generally remain the same.

3.10 Total Annual Operations

Table 3-23 combines the separate projections to create the recommended forecast of total annual operations. For each, the forecast values previously presented have been rounded to the nearest hundredth.

TABLE 3-23
TOTAL ANNUAL OPERATIONS – RECOMMENDED FORECAST

	Passenger Service Carriers	All-Cargo Carriers	General Aviation	Military	Total
Base Year					
2014	5,010	0	117,252	393	122,655
Forecast					
2020	6,900	200	148,600	1,000	156,700
2025	9,000	200	168,200	1,000	178,400
2035	14,900	300	216,000	1,000	232,200
Average Annual Change					3.1%

SOURCE: ESA, 2015.

Table 3-24 summarizes the total operations that could be realized for each of the alternative growth scenarios. These totals have also been rounded to the nearest hundred.

TABLE 3-24
TOTAL OPERATIONS UNDER ALTERNATIVE GROWTH SCENARIOS

	International Charter Scenario	High-Growth Scenario
Base Year		
2014	122,655	122,655
Forecast		
2020	157,100	170,900
2025	179,100	209,700
2035	233,200	314,800
Average Annual Change	3.1%	4.6%

SOURCE: ESA, 2015.

3.11 Categories of Aircraft Operations

The following sections present different categories or types of activity that will make up the forecasted operations. This includes a break out of the local, itinerant, and instrument operations. Further analyses include determining the operational aircraft fleet mix and estimates of the activity peaks, as well as an estimate of the automobile parking levels expected from the airline operations.

While only the recommended forecasts have been included in these sections, it is assumed that the alternative growth scenarios would have similar traits.

3.11.1 Local versus Itinerant Aircraft Operations

Based on historic ATCT counts, the split between local and itinerant traffic has remained relatively constant averaging 43 percent local and 57 percent itinerant since 2001. In 2014, local activity was below average (**Table 3-25**), reflecting the declines in flight training described previously. The anticipated rebound in flight training activity at MLB would increase general aviation operations as a whole, which by themselves have historically been 45 percent local and 55 percent itinerant.

When determining future splits, all passenger carrier and the projected all-cargo carrier operations were included in the itinerant count by default. Military activity was split based on the historic average of 80 percent local. For general aviation, the local share is expected to gradually shift back to the historic average by the end of the planning period. Since these operations represent a significant part of MLB's activity, the overall share of local operations will also increase. Regardless, increases in both types of operations are expected throughout the planning period.

TABLE 3-25
FORECAST OF LOCAL VERSUS ITINERANT OPERATIONS

	Local		Itinerant		Total
Base Year					
2014	43,698	36%	78,957	64%	122,655
Forecast					
2020	60,200	38%	96,500	62%	156,700
2025	73,100	41%	105,300	59%	178,400
2035	98,000	42%	134,200	58%	232,200

SOURCE: ESA, 2015.

3.11.2 Instrument Operations

A separate estimate of instrument operations conducted at MLB is important when evaluating future facility requirements. Using data from FAA's OPSNET, the number of instrument flight rule (IFR) operations was calculated. Since 2001, instrument operations peaked at 26 percent three times, most recently in 2014. The lowest level was 16 percent, which occurred in 2011, the busiest flight training year on record since 2001.

To provide an estimate of future IFR operations, the overall annual average of 22 percent since 2001 was applied. While there have been lower and higher shares of instrument operations, no direct relationship could be inferred based on the data available. Therefore, for the future planning horizons, the historic average was assumed a reasonable estimate of future instrument operations (see **Table 3-26**).

TABLE 3-26
ESTIMATE OF INSTRUMENT OPERATIONS

	Instrument Operations
Base Year	
2014	31,936
Forecast	
2020	34,500
2025	39,200
2035	51,000

SOURCE: ESA, 2015.

It should be noted that the percent of instrument operations is different from the actual percentage of the year that the airport experiences IFR conditions. Unlike the weather observations addressed in the previous chapter, the count and subsequent estimate of instrument operations include those conducted during actual instrument meteorological conditions as well as the ones simply under an IFR flight plan. The latter would include all commercial airline operations, regardless of weather conditions and flight training for simulated instrument conditions or approaches.

3.11.3 Operational Fleet Mix

Operational fleet mix is an important factor in determining the specific needs for various airfield improvements. Unfortunately, while ATCT counts do not include aircraft type, IFR flight plans do and are the source of the FlightAware dataset obtained for this study. Although some aircraft registration information is blocked, this data includes all commercial service airlines and a number of general aviation jet aircraft. The data also has a number of counts related to the other categories of aircraft. The data records included 44 percent single-engine, 18 percent multi-engine, 38 percent jet, and a few rotorcraft operations. This was used as the initial basis for estimating the current operational fleet mix for MLB. The final estimate was based on assumptions generated from the information collected during interviews with airport management, the passenger airlines, airport tenants, and other significant users of the airfield.

Information from the FAA 2014 Aerospace Forecast was then utilized to project how the operational fleet mix would change over the next 20 years (**Table 3-27**). The FAA anticipates growth and increased utilization for every category with the exception of the single-engine and multi-engine piston aircraft. As with the size of their active fleet, the most significant growth will be realized in the utilization of jet aircraft and turbine rotorcraft. Nationally, the FAA projects the use of jet aircraft to increase 136 percent by 2034 and rotorcraft 79 percent. As with based aircraft, the other category was utilized to represent military operations.

TABLE 3-27
PROJECTED OPERATIONAL FLEET MIX

	Base Year	Forecast Years		
	2014[a]	**2020**	**2025**	**2035**
Single-Engine	93,218	114,400	123,100	139,300
Multi-Engine (piston & turboprop)	17,172	21,900	23,200	28,000
Jet	7,359	12,500	21,400	46,400
Rotorcraft	4,513	6,900	9,700	17,500
Other (military)	393	1,000	1,000	1,000
Total	**122,655**	**156,700**	**178,400**	**232,200**

[a] Estimate as records do not include type of aircraft conducting operation.

SOURCE: FAA Form 5010-1 (current fleet mix) and ESA, 2015.

The projections reflected in Table 3-27 are generally based on expected national trends. The significant growth shown for jet aircraft operations at MLB also takes into consideration the projected level of based jets, as well as the business and overall economic outlook for Melbourne and Brevard County. Due to their size, weight, and performance requirements, jet aircraft are typically the design aircraft for most airside airport facilities. This will be addressed further as part of the facility requirements.

Overall, the general aviation jet activity will continue to include a number of the light to medium-sized business jets that have a maximum allowable takeoff weight between 10,000 and 60,000 pounds. This group includes the Embraer Phenom and Legacy aircraft, Beechcraft Hawker, Bombardier Learjet, Cessna Citation, and Dassault Falcon type jet aircraft that currently operate into MLB on a regular basis. In the short-term, jet activity will also include an increase in the current operations conducted by the much larger and heavier business jet fleet over 60,000 pounds. This would include the Bombardier Global Express, larger Dassault Falcon, and Gulfstream series of aircraft, as well as the Boeing Business Jet and Airbus Corporate Jet.

The general aviation jet activity also includes a number of heavy jet aircraft serviced by MRO operators. While they have programs for a variety of aircraft, it was not uncommon for multiple Boeing 747-400 to be at airport at any given time. As for the anticipated jets of the commercial passenger fleet, these were described previously, including the larger wide-body aircraft potential of the international charter operators. And finally, those related to all-cargo operations could vary quite substantially, with the possibility of heavy lift jet aircraft and/or some turboprop aircraft.

3.11.4 Peak Activity Projections

Annual projections provide a good overview of the activity at an airport, but may not reflect certain operational characteristics of the facility. In many cases, facility requirements are not driven by annual demand, but rather by the capacity shortfalls and delays experienced during peak times.

Therefore, estimates of the peak month, the average day in the peak month, and the peak hour demand for airline passengers and aircraft operations are needed.

3.11.4.1 Peaks in Total Passenger Activity

Total passenger activity levels reflect both the arriving and departing passengers using the airport. While enplanements are a standard measure of passenger levels, it is necessary to consider both enplaning and deplaning activity from a facility standpoint since the two can occur simultaneously. For simplicity, the past trends and expected level for passenger enplanements have been utilized in this analysis. This follows the accepted practice of doubling passenger enplanements to derive an estimate of the overall, total passenger activity for an airport (**Table 3-28**).

A review of the available historic monthly enplanements between 2003 and 2014 showed that March was the busiest month for passengers, for all but one year. In 2013, April was the busiest, but only by 220 enplanements. Historically, enplanements in March have accounted for 10.8 percent of the total annual enplaned passengers. This percentage was applied to the projected passenger levels to calculate future peak month activity and then divided by 31 to reflect the average day activity for March.

Because hourly enplanement data was not available, the total number of passengers that could be expected during the peak hour was estimated. For MLB, the most recent airline schedules reflect that most days (including weekends) have a peak hour in the early afternoon. Taking the February 2015 schedule for example, nearly every day there is the arrival and departure of an American CRJ700 and a Delta MD88 between 1:19 p.m. and 2:18 p.m. This creates 432 total seats in the hour that these two aircraft arrive and depart. At a 100 percent load factor, this number of seats results in a regular peak hour where it is possible that 26.8 percent of the average day passengers could be at the airport at the same time.

It has been assumed previously that the projected passenger enplanements will be accommodated through a relatively similar narrow-body and regional jet fleet mix; operating with a slowly increasing average load factor; and serving existing and new destinations. Given this, no significant changes are expected in the future with respect to the current peak hour estimate. This is largely due to the similar fleet expected; that MLB does not serves as a hub airport; and the goal to provide flight options/flexibility throughout the day. Therefore, the current peaking characteristics were applied to estimate future levels. The figures included in Table 3-28 have been rounded to the nearest tenth.

TABLE 3-28
PEAKS IN TOTAL PASSENGER ACTIVITY

	Total Annual Passenger Level[a]	Peak Month	Average Day of Peak Month	Peak Hour of Average Day
Base Year				
2014	448,520	48,440	1,560	420
Forecast				
2020	619,200	66,870	2,160	580
2025	810,000	87,480	2,820	760
2035	1,386,200	149,710	4,830	1,290

[a] Total annual passenger levels estimated by doubling corresponding enplanement levels.

SOURCE: ESA, 2015.

3.11.4.2 Peaks in Total Airport Operations

Review of the monthly OPSNET data reveals that since 2001, operations have either peaked in the fall (primarily October) or spring (March and April). This is likely the result of the significant flight training activity, a majority of which occurs during these times of the year. On average, these peak months represent 10.7 percent of the annual operations. Since there was a fairly equal split between the historic peak months with 30 versus 31 days, a value of 30.5 was used to derive the number of operations for the average day of the peak month. No historical data was available to determine the peak hour operations at the MLB; therefore, it was estimated that 15 percent of the peak month average day would best represent the number of peak hour operations. The resulting estimates in **Table 3-29** have been rounded to the nearest tenth.

TABLE 3-29
PEAKS IN TOTAL AIRPORT OPERATIONS

	Total Annual Operations	Peak Month	Average Day of Peak Month	Peak Hour of Average Day
Base Year				
2014	122,655	13,120	430	60
Forecast				
2020	156,700	16,770	550	80
2025	178,400	19,090	630	90
2035	232,200	24,850	810	120

SOURCE: ESA, 2015.

3.11.5 Public Automobile Parking Levels

A general projection of the expected automobile parking levels was made based on the airport's transaction counts. The most recent data available from September 2013 to August 2014 showed a total of 93,294 exits from the public parking lot. In the absence of more detailed historic data, it is assumed that the number of vehicle exits is directly related to the number of passenger enplanements. As such, the expected growth in passengers (5.5 percent each year) was utilized to project future public automobile parking levels. The result of 287,200 exits by 2035 is three times the current level. Information on how the parking lots are utilized will be combined with this projection as part of the facility requirements.

3.12 FAA Terminal Area Forecast Comparison

If an airport is included in the FAA TAF, any new forecasts need to be reviewed and approved by the agency before they can be applied to further analyses. During this review the FAA looks to see if the passenger enplanements, annual operations, or based aircraft forecasts differ from the TAF by any more than ten percent in the five year and 15 percent in the ten year planning period.

Regarding the FAA review, the FAA Director of Airport Planning and Programming (APP-1) published a guidance paper in June 2008 entitled, *Review and Approval of Aviation Forecasts*. This guidance states:

> "If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both. FAA decision-making includes key environmental issues (e.g. purpose and need, air quality, noise, land use), noise compatibility planning (14 CFR Part 150), approval of development on an airport layout plan, and initial financial decisions including issuance of LOI's and calculation of BCA's."

As shown in **Table 3-30**, the recommended forecasts for passenger enplanements and annual operations exceed the review criteria. Sometimes, the issue is related to the fact that the TAF figures are based on the FAA's fiscal year which ends on September 30, while airport forecasts tend to be based on the calendar year. That is not the problem here. With respect to the passenger enplanement levels, the first concern is that the TAF is already 5.0 percent less than the actual number recorded in 2014. Compounding this is the TAF's limited growth (0.3 percent per year) which only projects just over 220,000 annual enplanements by 2025; less than the actual passenger enplanements documented for MLB in 2014.

For the difference in annual operations, the concern rests with the prediction of MLB's activity by the TAF between 2013 and 2025. Annual operations in the TAF are projected to increase 1.8 percent in first year (between 2013 and 2014). Next the TAF decreases operations by 3.8 percent for 2015, which is then followed with an average annual growth of only of 0.4 percent through 2040. While the airport (and nation as a whole) has experienced losses in operations over the past couple of years, the TAF projection does not show any recovery over the course of 27 years. Given

the area's economic growth, expansion of airport facilities, latent flight training capacity of FIT, and the fact it has recently been the busiest airport in the nation with a contract tower, the TAF projection of annual operations is not considered reasonable for MLB. **Appendix A** includes information presented at a meeting to address the FAA's general concerns surrounding the recommended forecasts. This includes the activity and marketing efforts that have occurred at the airport since the activity forecasts were prepared using 2014 data as a base year.

TABLE 3-30
COMPARISON OF FORECASTS TO FAA TAF

	Recommended Forecast	2015 FAA TAF[a]	Recommended to TAF Difference
Passenger Enplanements			
Base Year (2014)	224,260	213,640	5.0%
5 Year (2020)	309,600	217,037	42.6%
10 Year (2025)	405,000	220,079	84.0%
Annual Operations			
Base Year (2014)	122,655	132,316	-7.3%
5 Year (2020)	156,700	129,765	20.8%
10 Year (2025)	178,400	132,357	34.8%
Based Aircraft			
Base Year (2014)	235	240	-2.1%
5 Year (2020)	270	275	-1.8%
10 Year (2025)	302	313	-3.5%

[a] Data based on FAA fiscal year which ends September 30th.

SOURCE: ESA and January 2015 FAA TAF.

3.13 Aviation Activity Forecast Summary

Table 3-31 presents an overview of the recommended forecasts. The data and methods used to forecast aviation demand for the airport are consistent with those used by the FAA and other airports around the nation. These forecasts are considered to reasonably reflect the activity anticipated at MLB through 2035 given the information available during this study.

TABLE 3-31
SUMMARY OF RECOMMENDED FORECASTS

	Base Year	Forecast Years		
	2014	**2020**	**2025**	**2035**
Passenger Enplanements	**224,260**	**309,600**	**405,000**	**693,100**
Annual Operations				
Passenger Service Carriers	5,010	6,900	9,000	14,900
All-Cargo Carriers	0	200	200	300
General Aviation	117,252	148,600	168,200	216,000
Military	393	1,000	1,000	1,000
Total	**122,655**	**156,700**	**178,400**	**232,200**
Based Aircraft				
Single-Engine	167	181	191	226
Multi-Engine (piston & turboprop)	45	54	63	75
Jet	16	24	33	45
Rotorcraft	6	10	14	29
Other (military)	1	1	1	1
Total	**235**	**270**	**302**	**376**
Categories of Operations				
Local Operations	43,698	60,200	73,100	98,000
Itinerant Operations	78,957	96,500	105,300	134,200
Instrument Operations	31,936	34,500	39,200	51,000
Operational Fleet Mix				
Single-Engine	93,218	114,400	123,100	139,300
Multi-Engine (piston & turboprop)	17,172	21,900	23,200	28,000
Jet	7,359	12,500	21,400	46,400
Rotorcraft	4,513	6,900	9,700	17,500
Other (military)	393	1,000	1,000	1,000
Peaks in Total Passenger Activity				
Total Annual Passenger Level	448,520	619,200	810,000	1,386,200
Peak Month	48,440	66,870	87,480	149,710
Average Day of Peak Month	1,560	2,160	2,820	4,830
Peak Hour of Average Day	420	580	760	1,290
Peaks in Total Airport Operations				
Peak Month	13,120	16,770	19,090	24,850
Average Day of Peak Month	430	550	630	810
Peak Hour of Average Day	60	80	90	120
Other Projections				
Passenger Airline Cargo (pounds)	267,900	277,700	286,200	303,800
Public Automobile Parking Levels (exits)	93,294	128,600	168,100	287,200

SOURCE: ESA, 2015.

CHAPTER 4

Facility Assessment and Requirements

CHAPTER 4

Facility Assessment and Requirements

4.1 Introduction

To ensure that the Orlando Melbourne International Airport (MLB) will adequately accommodate demand expected during the 20-year planning period, this chapter evaluates and establishes the improvements necessary to maintain a safe and efficient facility. As a commercial service airport, MLB holds an operating certificate with the Federal Aviation Administration (FAA). This certification process includes, among other things, annual inspections of the airfield and various airport facilities. Even though the airport maintains its operating certificate, improvements are needed to accommodate the facility's existing and future infrastructure requirements.

Because airport development is costly and facilities should last for many years, care must be taken to ensure that these and every other proposed project will effectively satisfy the needs identified. In doing so, the following sections use planning activity levels and the appropriate design criteria to define the expected facility requirements.

4.1.1 Planning Activity Levels

Since there are a number of uncertainties associated with long-term activity forecasting, planning activity levels (PALs) were established to represent future levels at which different facility improvements would be required. This demand-based approach allows future improvements to be based on when the future PAL will be reached, rather than a set point in time. **Table 4-1** defines the PALs which are based on thresholds similar to recommended forecasts.

Summary of Key Airport Facility Requirements

- Renovate and Expand Passenger Terminal Facilities
- Improve Runway System for Current Aircraft Activity
- Enhance Taxiway Efficiency and Incorporate Newer FAA Standards
- New Airport Traffic Control Tower
- Continue Airport-wide Pavement Maintenance and Rehabilitation
- Maintain and Support Expansion of General Aviation Facilities
- Increase Capacity of Parking and Rental Car Facilities
- Continue to Facilitate Economic Development and Commerce (both airside and landside)

TABLE 4-1
PLANNING ACTIVITY LEVELS

	Passenger Enplanements	Annual Operations	Based Aircraft
Base Year			
2014	224,260	122,655	235
Planning Activity Level			
PAL-1	300,000	150,000	275
PAL-2	400,000	175,000	300
PAL-3	700,000	235,000	375

SOURCE: ESA, 2016.

4.1.2 Applicable Airport Design Standards

Airport planning criteria and design standards require the selection of one or more critical design aircraft, defined as the most demanding aircraft for a specific airport component that conducts, or is expected to conduct, a minimum of 500 annual itinerant operations. These aircraft classify airport facilities based on Approach Reference Codes (APRC), Departure Reference Codes (DPRC), Runway Design Codes (RDC), and Taxiway Design Groups defined in FAA Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*.

4.1.2.1 Runway Reference and Design Codes

Approach and departure codes identify the current operational capabilities for each runway with a parallel taxiway, where no special procedures are required for landing or takeoff operations. As such, runways can have more than one APRC or DPRC code for different aircraft groups and these codes may change as airfield improvements are made. Conversely, while the APRC and DPRC designations identify existing operational limitations for each runway, the RDC is utilized to plan future runway requirements.

For all three codes, the first component is the Aircraft Approach Category (AAC) which is depicted by a letter and relates to the aircraft's landing approach speed (operational characteristic). The second component is the Airplane Design Group (ADG) which uses Roman numerals to identify the critical aircraft wingspan or tail height (physical characteristics). For APRC and RDC, a third component relates to the visibility minimums associated with the runway, or group of runways, expressed in the Runway Visual Range (RVR) values. For runways with only existing and future visual approaches, the third component should be "VIS" in lieu of the visibility minimums. The ranges for these three components are included in **Table 2-1** of the existing conditions chapter.

4.1.2.2 Critical Design Aircraft

Each of the three active runways at MLB has a different critical design aircraft. This is primarily due to their physical dimensions and the types of aircraft each runway was designed to accommodate. While both of the parallel runways, Runway 9R/27L and Runway 9L/27R, accommodate commercial size aircraft and a wide range of general aviation (GA) aircraft, only the primary Runway 9R/27L can support the largest aircraft operating at MLB. Conversely, Runway 5/23 is only capable of supporting activity by the smaller GA aircraft fleet. The current and future critical aircraft for each runway are described in the following sections and summarized in **Table 4-2**. The representative aircraft presented are based on aircraft activity data obtained for MLB (February 2014 through February 2015)[1] and the detailed aircraft fleet mix information documented in the concurrent update to the MLB Part 150 noise compatibility study.

Runway 9R/27L Critical Design Aircraft

Over the past several years the most demanding aircraft operating on Runway 9R/27L on a regular basis have ranged between the runway design components of C-IV and D-V. These have primarily included the Boeing 757 (C-IV), E-8C (C-IV), Boeing 767 (D-IV), and Boeing 747 (D-V) aircraft. While the Boeing 747 activity at MLB has been increasing, the Boeing 767 is considered the best representative existing critical aircraft for this composite group of aircraft which conducted 819 operations in 2014. Given the runway's current Instrument Landing System (ILS) and parallel Taxiway A offset of 495 feet, the APRCs are D-IV-2400 and D-V-2400. The 495 foot offset of Taxiway A also results in the two DPRCs of D-IV and D-V.

In the future, neither the parallel taxiway separation nor the ILS minimums are expected to change. However, between the current heavy aircraft maintenance and expected growth in both international air charter service and dedicated all-cargo carriers, the operations by D-V aircraft such as the Boeing 747 and 787 will likely exceed 500 annual operations within the next five to ten years. In fact, 751 annual operations of the larger international charter and all-cargo aircraft are forecast by 2025; most of which are expected to be D-V. Therefore, the Boeing 747 has been selected as the representative future critical aircraft for the Runway 9R/27L RDC of D-V-2400.

Runway 9L/27R Critical Aircraft

With an overall length of 6,000 feet, Runway 9L/27R is capable of supporting large GA aircraft with minimal restrictions and even a majority of the current commercial passenger airline fleet serving MLB, under certain conditions. However, due to the 325 foot centerline offset with parallel Taxiway K, the critical design components for the runway are limited to D-II. When combined with the existing visibility minimums, the current APRCs for the runway are B-III-4000 and D-II-4000. This means that when the larger ADG III aircraft utilize Runway 9L/27R, they must operate with certain limitations and/or obtain prior approval from the airport during instrument conditions. Similarly, the DPRCs for the runway are B-III and D-II, indicating special operating procedures may be required for the larger ADG III aircraft. These limitations and/or special operating

[1] *Flight History Report for the Melbourne International Airport*. FlightAware, Inc.

procedures manage simultaneous ADG III movements on Runway 9L/27R and parallel Taxiway K, in lieu of adequate centerline separation.

The D-II designation accommodates nearly every GA jet aircraft with a maximum takeoff weight that is more than 12,500 pounds but less than or equal to 60,000 pounds, as well as a number of business jets with a weight greater than 60,000 pounds. As reflected in the recent FlightAware data, a majority of the jet operations within the D-II range at MLB are conducted by light to medium-sized business jet aircraft such as the Embraer Phenom, Embraer Legacy, Beechcraft Hawker, Bombardier Challenger, Bombardier Learjet, Cessna Citation, and Dassault Falcon series aircraft. GA aircraft over 60,000 pounds are primarily comprised of the larger Dassault Falcon and Gulfstream series of aircraft, but also include the occasional Airbus Corporate Jet, Boeing Business Jet, and Bombardier Global Express. Within the D-II range for Runway 9L/27R, the Gulfstream G450 has been selected as the current representative critical aircraft.

Due to the expected increase in the larger business jet aircraft, the occasional use by the larger commercial aircraft, and no changes to the current instrument approach minimums; a RDC of C-III-4000 is planned. For the business jet fleet, the C-III group of aircraft includes the Airbus Corporate Jet (Airbus 320), Boeing Business Jet (Boeing 737), Bombardier Global Express, largest Dassault Falcon series aircraft, and Gulfstream models such as the G550 and G650. In addition to the occasional McDonnell Douglas MD-88, MD-90, Airbus A319, and Boeing 717 commercial passenger aircraft that might use the runway, the C-III designation would also accommodate the Airbus A320 and Boeing 737 aircraft projected for the airlines. The Boeing 737 has been selected as the future critical aircraft for Runway 9L/27R since it represents the largest GA aircraft expected to use the runway on a regular basis as well as the average type of commercial aircraft that may use Runway 9L/27R throughout the planning period.

Runway 5/23 Critical Aircraft

The current critical design components for Runway 5/23 are A-I due to its physical dimensions and location on the airfield. Runway 5/23 is also limited to small aircraft exclusively (aircraft with a maximum certificated takeoff weight of 12,500 or less) due to the 200-foot centerline offset with parallel Taxiway D. Consequently, the APRC is B-I(S)-VIS and the DPRC is B-I(S) with the (S) denoting the small aircraft limitation.

The current A-I designation is predominantly based on aircraft such as the Piper PA-44-180 Seminole operated by the Florida Institute of Technology’s School of Aeronautics (FIT Aviation), as well as other users. However, as noted in the wind coverage section, the parallel runways at MLB do not provide 95 percent coverage for the 10.5 knot crosswind component. Therefore, Runway 5/23 is required to provide adequate crosswind coverage for aircraft with the design components of A-I as well as B-I. Taking this requirement into consideration, the critical aircraft needs to be changed to reflect the slightly faster B-I aircraft within the 12,500-pound limitation that use Runway 5/23. While larger aircraft do use the runway on occasion, this practice is limited and only at the pilot’s discretion. As such, the runway is capable of safely accommodating nearly every single-engine piston and multi-engine piston aircraft, as well as a number of twin turboprops. The Beechcraft King Air B100 has been selected as the future representative critical aircraft for Runway

5/23 as it is one of the largest and most popular of the B-I aircraft under 12,500 pounds. Therefore, the RDC for Runway 5/23 is B-I-VIS.

TABLE 4-2
CURRENT AND FUTURE RUNWAY CODES

Runway	Current Critical Aircraft	Approach Reference Code (APRC)	Departure Reference Code (DPRC)	Runway Design Code (RDC)
9R/27L	D-IV (Boeing 767)	D-IV-2400 D-V-2400	D-IV D-V	D-V-2400 (Boeing 747)
9L/27R	D-II (Gulfstream G450)	B-III-4000 D-II-4000	B-III D-II	C-III-4000 (Boeing 737)
5/23	A-I (Piper Seminole)	B-I(S)-VIS	B-I(S)	B-I-VIS (King Air B100)

SOURCE: FAA AC 150/5300-13A, Change 1, *Airport Design* and ESA, 2016.

4.1.2.3 Taxiway Design Groups

When the 2004 Master Plan was prepared, taxiways were solely based on the ADG (wingspan) of the critical aircraft they served. Now some of the taxiway design standards utilize a Taxiway Design Group (TDG) which is based on the overall width of the aircraft's main gear as well as the distance between the main gear and the cockpit. Designation of the TDG is determined through the use of a chart in FAA AC 150/5300-13A, Change 1.

This newer approach offers proper taxiway width and separation dimensions, while at the same time a better method for determining the required turning radii and edge fillets. The intent is to provide the appropriate taxiway geometry while minimizing excess pavement and limiting the potential for confusing layouts. As illustrated in the table below, it is possible to have different taxiway standards on an airfield, depending on which facilities they serve. Aircraft parking aprons and hangar areas will also vary based on the aircraft they serve and whether or not the facility is accessed via a taxiway or taxilane.

TABLE 4-3
TAXIWAY DESIGN GROUPS

	Existing	Future
Runway 9R/27L	5	5
Runway 9L/27R	1A / 3	3
Runway 5/23	1A	1A

SOURCE: FAA AC 150/5300-13A, Change 1, *Airport Design*.

4.2 Airport Capacity

Airport capacity is defined by the FAA as a measure of an airfield's ability to accommodate the maximum number of aircraft operations. Estimates of airfield capacity at MLB were developed in accordance with the methods presented in FAA AC 150/5060-5, Change 2, *Airport Capacity and Delay*. Methodologies from this AC were used to calculate the hourly capacity of the runway system and annual service volume (ASV) of the airfield. These calculations were based upon the specific airfield, operational, and meteorological characteristics of the airport on a typical day.

4.2.1 Airfield Geometry

The airfield configuration is the primary factor in determining the overall airport capacity due to its direct influence on how aircraft can operate. In theory, as the number of runways and taxiways increase, so should the capacity at a given airfield. However, the physical orientation and proximity of the various runway and taxiway surfaces may or may not contribute to the overall airfield capacity.

4.2.1.1 Runway Configuration

Under certain conditions the airport is capable of supporting simultaneous operations using two and occasionally all three runways. The parallel runways have an east to west alignment and are located north of the crosswind runway (Runway 5/23) which has a northeast to southwest orientation. As the Runway 23 end does not physically cross or tie into the parallel runway system, this orientation of runways is referred to as an "open V" configuration (see Figure 2-1).

Under Visual Flight Rules (VFR) conditions, simultaneous operations can be conducted on the parallel runway system. As described later, these conditions occur frequently throughout the year and increase the overall average annual capacity of the airfield. However, there are times, even during VFR conditions, where the airport may be treated as a single runway environment. Because the parallel runway centerline spacing is less than 2,500 feet (actual 1,475 feet), it is possible with certain aircraft operating combinations that wake turbulence can be a factor. The airport traffic control tower (ATCT) makes the determination whether it is necessary to suspend the ability to handle simultaneous arrivals or departures. Similarly, during some crosswind conditions, the parallel runways may not be suitable for the smaller and lighter aircraft. If a pilot in command requires Runway 5/23, the airfield capacity can be limited to that of a single runway environment, but typically only for short periods of time.

Different runway-use diagrams from the FAA *Airport Capacity and Delay* AC have been utilized to calculate the capacity of the existing runway configuration. These enabled the appropriate calculations to be made for when conditions allow simultaneous operations and when the airfield is limited to a single runway operation, whether in an east or west flow.

4.2.1.2 Exit Taxiways

The capacity of a runway system is greatly influenced by the ability of aircraft to exit the runway as quickly and safely as possible. Once an aircraft has left the runway, another is able to either

land or takeoff. Therefore, the number and location of exit taxiways directly influence runway occupancy time and overall capacity of the system. Capacity is also enhanced if a full-length, parallel taxiway is provided since these taxiways generally have several connector taxiways (increasing the number of runway exits) and eliminate the need to back-taxi on the runway.

While all three runways at MLB have parallel taxiways with multiple connectors, the primary runway does not have a true full-length parallel system. Due to the orientation of Runway 5/23, the parallel taxiway to Runway 9R/27L (Taxiway A) turns southeast to cross Runway 5/23 just south of the displaced Runway 27L threshold (see **Figure 4-5**). However, in the FAA methodology, the calculations use an exit factor based upon the number of connector taxiways within a certain range. When this exit range and the runway end access provided by Taxiway T are considered, there is no capacity penalty to the operations on Runway 9R/27L due to the configuration of parallel Taxiway A.

The optimal range for exit taxiways varies for different runway configurations and is primarily based on the aircraft mix index (described in a following section). For the first half of the planning period this range is 2,000 feet to 4,000 feet from the landing threshold for each runway. By the end of the planning period the range will be 3,000 feet to 5,500 feet on the parallel runways as it only applies to the runways serving the heavier, Class D aircraft. In both instances, each exit taxiway must be separated by at least 750 feet to be included in the calculations. Using these criteria, the number of taxiway exits for each runway that can be used when calculating capacity are shown in **Table 4-4**.

TABLE 4-4
ELIGIBLE TAXIWAY EXITS FOR CAPACITY CALCULATIONS

	2,000 to 4,000 Foot Range	3,000 to 5,500 Foot Range
Runway 9R	1	1
Runway 27L	2	2
Runway 9L	2	1
Runway 27R	2	2
Runway 5	1	n/a
Runway 23	1	n/a

SOURCE: ESA, 2016.

4.2.2 Operational Characteristics

Operational characteristics include the aircraft mix index, the percent of aircraft arrivals, and the percent of aircraft touch and go operations. Each of these are described in the following sections as they are each variables when estimating capacity using the FAA methodology.

4.2.2.1 Aircraft Mix Index

The FAA has designated four categories of aircraft for capacity determinations which are based upon the maximum certificated takeoff weight, the number of engines, and the wake turbulence classifications. In the simplest terms, larger and heavier aircraft create more wake turbulence and require more spacing for this turbulence to subside before another aircraft travels through the same area. Likewise, as an aircraft's size and weight increases, so does the time typically needed for it to slow to a safe taxiing speed or to achieve the needed speed for takeoff. Therefore, larger aircraft require more runway occupancy time than smaller ones. For these reasons, aircraft classifications are used to determine the aircraft mix index.

The mix index is calculated by adding the percent of Class C aircraft plus three times the percent of Class D aircraft. The percent of Class A and B aircraft (both under 12,500 pounds) is not considered to significantly affect airfield capacity because the wake turbulence generated by these smaller aircraft dissipates fairly rapidly. Thus other aircraft can be spaced closer to Class A and B aircraft than to a Class C or D aircraft. Class C aircraft include multi-engine aircraft greater than 12,500 pounds, but less than 300,000 pounds with a large wake turbulence classification. Class D are multi-engine aircraft over 300,000 pounds with a heavy wake turbulence classification. It should be noted that these capacity classes differ from the Aircraft Approach Categories described in other sections of this study.

Class C aircraft primarily consist of business jets, but also include the regularly scheduled passenger airline fleets. Even though there are some business jets less than 12,500 pounds operating at MLB, for planning purposes, all of the jet aircraft in the operational fleet mix will be considered as Class C aircraft. This helps create a more conservative evaluation of the current and future runway capacity. It also accounts for the operations conducted by turboprops and rotorcraft over 12,500 pounds, which are not segregated in the operational fleet mix figures. All of the international charter, all-cargo, and military activity were classified as Class D aircraft. While not all of the historic military activity is conducted by heavy aircraft like the US Air Force E-8C (Joint STARS) or dedicated cargo flights; the other operations include numerous high speed military aircraft. Typically, the higher speed aircraft would have a spacing requirement similar to that required for the heavy aircraft wake turbulence.

For the planning period, the aircraft mix index will increase from 7 during the 2014 base year to 10 in 2020, 14 in 2025, and 22 in 2035. It should be noted that this mix index does not change significantly nor would it change the results of this capacity analysis under either the International Charter or High-Growth scenarios presented in the forecast chapter of this Master Plan update. While the number of Class D aircraft operations increases in both scenarios, it does not significantly increase their overall percentages with respect to the total annual operations projected.

4.2.2.2 Percent of Aircraft Arrivals

The percent of arrivals is simply the ratio of aircraft arrivals to total operations during a peak or average hour of operations. The FAA methodology considers a 40, 50, or 60 percent arrivals factor to compute airfield capacity. Since aircraft on final approach are given priority over departures, a higher percent of arrivals during peak periods of operations can reduce the hourly capacity due to

the longer runway occupancy times for arrivals over departures. However, this is typically only considered when estimating capacity during peaks at airports with predominately commercial airline operations. At airports with primarily GA operations, the percent of arrivals is assumed to equal those of departures for any given time, even the peak hour. Therefore, the 50 percent arrivals factor was applied to the capacity calculations.

4.2.2.3 Percent of Touch and Go Operations

A touch and go operation refers to a training procedure in which the pilot performs a normal landing followed by an immediate takeoff, without stopping or taxiing clear of the runway. While each touch and go operation actually accounts for two runway operations (one landing and one takeoff), this procedure typically takes less time than two operations by separate aircraft. Therefore, airports with a high percent of touch and go operations will have a greater airfield capacity than a similar airport with less of these training operations.

The touch and go activity at MLB is significant due to the level of flight training, especially being the home to FIT Aviation, one of the nation's largest flight schools. The recent airport noise study used ATCT data to document that touch and go operations represented 40 percent of the overall activity in 2013. It is anticipated that the same level of touch and go operations will continue throughout the planning period. This assumption does not create any problems given that the highest touch and go factors within the FAA capacity tables are limited to 50 percent.

4.2.3 Meteorological Conditions

Different meteorological conditions influence the utilization of an airfield's runways. Variations in the weather resulting in limited cloud ceilings and reduced visibility typically lower airfield capacity, while changes in wind direction and velocity will dictate runway usage.

4.2.3.1 Ceiling and Visibility

As weather conditions deteriorate, pilots must rely on instruments to define their position both vertically and horizontally. Capacity is lowered during such conditions because aircraft are spaced further apart when they cannot see each other. For capacity calculations, the FAA defines three general weather categories, based upon the height of the clouds above ground level and visibility:

Visual Flight Rules (VFR) - Cloud ceiling is greater than 1,000 feet above ground level (AGL) and visibility is at least three statute miles.

Instrument Flight Rules (IFR) - Cloud ceiling is at least 500 AGL but less than 1,000 feet AGL and/or visibility is less than three statute miles but more than one statute mile.

Poor Visibility and Ceiling (PVC) - Cloud ceiling is less than 500 feet AGL and/or visibility is less than one statute mile.

Since MLB has instrument approach procedures established to all four ends of the parallel runways, the airport is capable of accommodating aircraft during IFR conditions. However, most airports, even those with precision approach capabilities, have limited times when operations occur under actual PVC conditions. Using the meteorological data collected for this study, the Melbourne area

averages VFR conditions 92 percent of the time, IFR conditions 8 percent of the time, and PVC conditions less than 1 percent of the time.

4.2.3.2 Wind Coverage and Runway Utilization

The wind coverage analysis presented in the existing conditions chapter showed that on average, the parallel runway system had slightly better coverage than Runway 5/23. While the combined runway orientations provide high crosswind coverage percentages, it is only under the 10.5 knot category that Runway 5/23 is needed to achieve the required 95 percent. However, wind coverage is not the only factor that determines operational flow, especially at an airport with an ATCT.

There have been a number of discussions and analyses conducted as part of the recent noise study for MLB to define runway utilization. In addition to wind conditions; the type of aircraft and type of operation are also important. As described, the parallel runways are aligned in an east-west orientation while Runway 5/23 is aligned to the northeast-southwest. This runway configuration takes advantage of the easterly sea breeze from the Atlantic Ocean.

All jet activity occurs on the parallel runway system, with Runway 9R/27L handling air carrier operations. While Runway 5/23 can only support small aircraft, the smaller GA aircraft utilize all runways depending on their type of operation and/or whether they are itinerant or touch and go operations. Runway 9L/27R is the predominant GA training runway, handling the greatest amount of the touch and go operations. Using data from the recent noise study, the individual runway end utilization for use in estimating airfield capacity is shown in **Table 4-5**.

TABLE 4-5
RUNWAY END UTILIZATION

	Annual Average
Runway 9R (East Flow)	19.1%
Runway 27L (West Flow)	12.9%
Runway 9L (East Flow)	32.6%
Runway 27R (West Flow)	22.9%
Runway 5 (East Flow)	8.3%
Runway 23 (West Flow)	4.2%

SOURCE: ESA, 2016.

4.2.4 Airfield Capacity Calculations

The preceding airfield geometry, operational characteristics, and meteorological conditions were first utilized to calculate hourly capacity. The results were then applied to determine the annual service volume in order to evaluate the ability of the airfield to accommodate the projected demand.

4.2.4.1 Hourly Capacity of the Runway System

The hourly capacity for MLB was calculated by analyzing the appropriate runway-use diagrams and figures for both VFR and IFR conditions. From the diagrams and figures, the aircraft mix index and percent of aircraft arrivals were utilized to calculate the hourly capacity base. Next, a touch and go factor was determined using the percent of touch and go operations with the aircraft mix index. Finally, the taxiway exit factor was determined by the aircraft mix index, percent of aircraft arrivals, and number of exit taxiways. A weighted hourly capacity was then calculated (**Table 4-6**) based on the percent that VFR and IFR conditions have historically been observed for each different operational flow.

TABLE 4-6
HOURLY CAPACITIES OF THE RUNWAY SYSTEM

	Average VFR Hourly Capacity	Average IFR Hourly Capacity	Weighted Hourly Capacity
Base Year			
2014	194	61	183
Planning Activity Level			
PAL-1	190	60	180
PAL-2	179	59	170
PAL-3	151	56	144

SOURCE: ESA, 2016.

It should be noted that all of the calculations are based on the existing airfield configuration. As such, the decrease in weighted hourly capacity reflects the impact that the additional larger and/or jet aircraft operations (i.e. increase in mix index) will have on the future hourly capacity, including the higher taxiway exit factor range towards the end of the planning period.

4.2.4.2 Annual Service Volume

Annual service volume (ASV) is the most important value that must be computed in order to understand the runway capacity at an airport. It represents the number of total operations that an airfield can support annually. In other words, ASV is the theoretical limit of operations that the airport can safely accommodate without delay occurring on a regular basis. To calculate ASV, first the ratio of annual demand to average daily demand, during the peak month, is calculated. Next, the ratio of average daily demand to average peak hour demand, during the same time is determined. These values are then multiplied together with the corresponding weighted hourly capacity to compute ASV.

TABLE 4-7
AIRFIELD CAPACITY ANALYSIS

	Annual Operations	Annual Service Volume (ASV)	Capacity Level
Base Year			
2014	122,655	374,000	33%
Planning Activity Level			
PAL-1	150,000	352,200	43%
PAL-2	175,000	336,000	52%
PAL-3	235,000	277,900	85%

SOURCE: ESA, 2016.

A demand that exceeds ASV results in significant delays on the airfield. However, no matter how substantial an airport's capacity may appear, it should be realized that delays can occur even before an airport reaches its stated capacity. In fact, according to FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*, capacity enhancing projects need sufficient lead times so that the improvements can be properly planned, designed, and constructed before the resulting delays become critical. For most every type of capacity enhancing project, the FAA recommends planning for such improvements when the activity levels reach 60 to 75 percent of the annual capacity.

As shown, MLB will remain below the 60 percent threshold through PAL-2. However, the 60 percent threshold would be exceeded between PAL-2 and PAL-3, which is expected to occur during the long-term planning period. Similarly, if the recommended forecast for annual operations is exceeded, the capacity levels would move up accordingly as reflected in **Table 4-8** for the two alternative forecast scenarios. As stated previously, the mix index associated with the two alternative forecast scenarios does not change significantly with respect to the capacity calculations. But, due to the overall activity, the capacity levels under the High-Growth scenario would trigger the FAA threshold for planning capacity enhancements before PAL-3 and, if left unmitigated, would exceed the overall airfield capacity before the end of the planning period.

TABLE 4-8
CAPACITY LEVELS UNDER ALTERNATIVE FORECAST SCENARIOS

		International Charter		High-Growth	
	Annual Service Volume (ASV)	Forecast Annual Operations	Capacity Level	Forecast Annual Operations	Capacity Level
Base Year					
2014	374,000	122,655	33%	122,655	33%
Planning Activity Level					
PAL-1 to PAL-2	352,200	157,100	45%	170,900	49%
PAL-2 to PAL-3	336,000	179,100	53%	209,700	62%
PAL-2 to beyond PAL-3	277,900	233,200	84%	314,800	113%

SOURCE: ESA, 2016.

4.2.5 Runway and Taxiway Flow Analysis

In addition to the FAA airfield capacity calculations, evaluations of the different airfield arrival and departure flows were made to identify any areas of concern. While the ability exists to occasionally utilize all three runways to accommodate a coordinated mix of arrivals and departures, the evaluation focused on the following scenarios:

- Parallel Runway System Movements – East and West Flows
- Runway 5/23 Movements – East and West Flows

In lieu of an airfield simulation model, assessing the different flows when the airfield is conducting simultaneous operations versus the single runway scenario provided the simplest way to observe how aircraft movements typically occur on the current taxiway system. Through conversations with air traffic control (ATC) management and major tenants of the airfield, the most common taxi routes utilized to access or exit the runway environment were documented. This enabled the evaluation to identify where future improvements should be considered, especially in light of the new FAA taxiway design guidance in AC 150/5300-13A, Change 1.

Additionally, information was reviewed from the July 2015 report evaluating Runway 5 incursions under the FAA Runway Incursion Mitigation (RIM) program.[2] Five incursions were reported for Runway 5 between 2010 and 2013. The report found that most of the Runway 5 incursions likely resulted from: 1.) the operation of the new aircraft parking apron (Central Apron) and taxiways serving student pilots and FIT Aviation's relocated fixed base operator (FBO) and 2.) student pilots who may have been preoccupied and/or had limited English language proficiency. The report

[2] *Evaluation of Runway 5 Incursions, Melbourne International Airport*. Prepared by Environmental Science Associates. July 30, 2015.

documented that mitigation measures had already been taken by the Melbourne Airport Authority (MAA) and FIT Aviation and concluded that the factors that most likely contributed to the runway incursions have been adequately addressed and that no runway incursions at this location have occurred since 2013.

4.2.5.1 Parallel Runway System Movements - East Flow

Typical aircraft arrival and departure movements for the parallel runways in an east flow are illustrated on **Figure 4-1**. Generally speaking, Runway 9R is utilized for all passenger airline, air cargo, and the largest GA aircraft operations, as well as most military activity. The runway is also utilized for at least the initial takeoff and final landing of the smaller flight training aircraft since most originate from the Central Apron area. For the most part, these training flights remaining in the local area or pattern are shifted to the north to conduct full stop landings, takeoffs, and touch and go operations on Runway 9L. The north parallel runway is also used for most aircraft movements to/from the North Apron and Northeast Apron areas, as well as the private tenant hangar and aircraft parking in these areas.

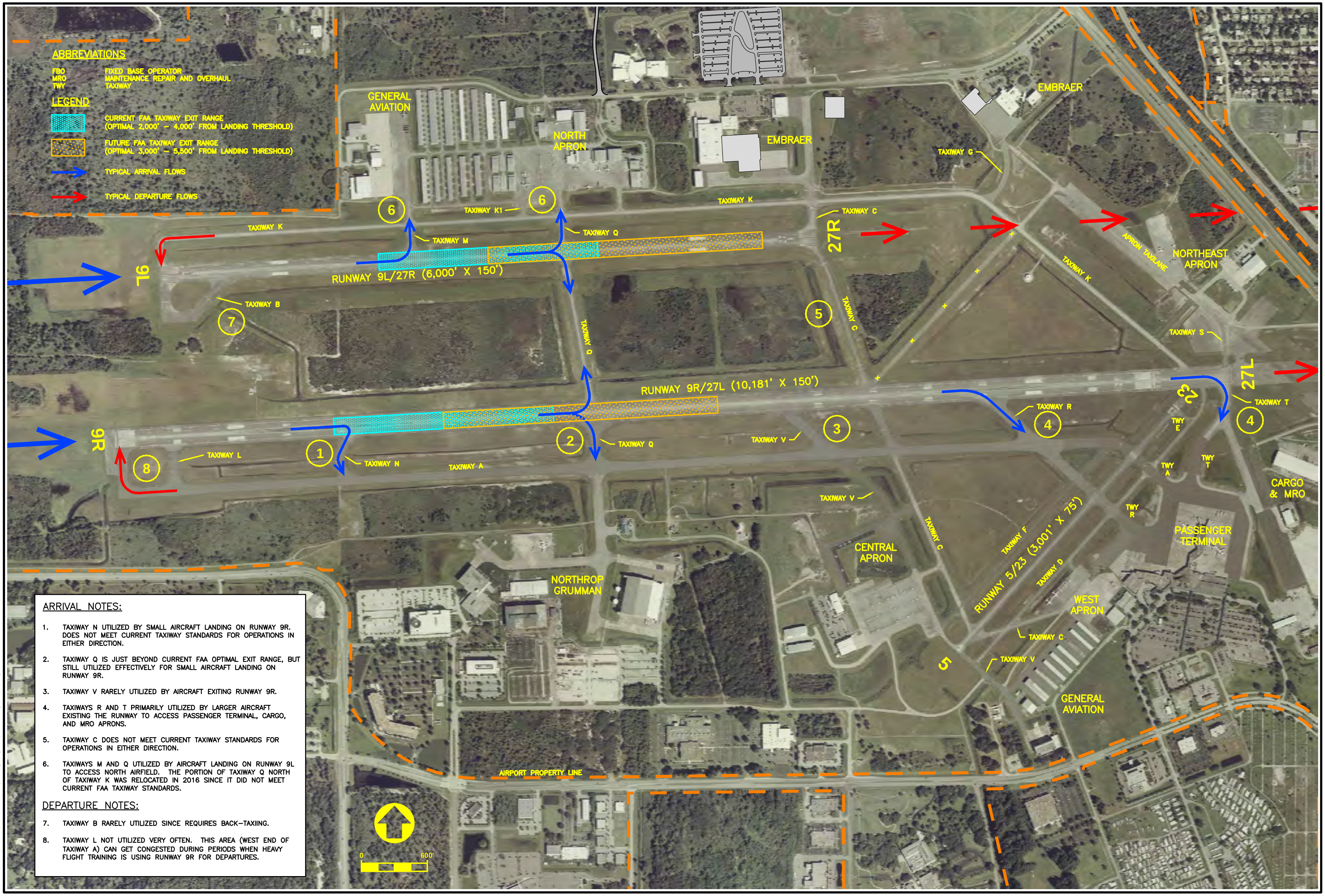
Figure 4-1 depicts both the current and future FAA taxiway exit ranges described previously as part of the capacity calculations. The primary observations include:

Arrivals

- Taxiway N utilized by small aircraft landing on Runway 9R. Does not meet current taxiway standards for operations in either direction.
- Taxiway Q is just beyond current FAA optimal exit range, but still utilized effectively for small aircraft landing on Runway 9R.
- Taxiway V rarely utilized by aircraft exiting Runway 9R.
- Taxiways R and T are primarily utilized by larger aircraft exiting the runway to access the passenger terminal, cargo, and maintenance repair and overhaul (MRO) facilities.
- Taxiway C does not meet current taxiway standards for operations in either direction.
- Taxiways M and Q utilized by aircraft landing on Runway 9L to access north airfield. The portion of Taxiway Q north of Taxiway K was relocated in 2016 since it did not meet current FAA taxiway design standards.

Departures

- Taxiway B rarely utilized since requires back-taxiing.
- Taxiway L not utilized very often. This area (west end of Taxiway A) can get congested during periods when heavy flight training is using Runway 9R for departures.



Source: ESA, 2016

FIGURE 4-1
PARALLEL RUNWAY SYSTEM MOVEMENTS - EAST FLOW

4.2.5.2 Parallel Runway System Movements - West Flow

Typical aircraft arrival and departure movements for the parallel runways in a west flow are illustrated on **Figure 4-2**. As with the east flow, the primary runway (Runway 27L for west flow) is utilized for all passenger airline, air cargo, and the largest GA aircraft operations, as well as most military activity. Likewise, Runway 27L is also utilized for the start and finish of the smaller flight training aircraft originating from the Central Apron area, while Runway 27R predominately supports aircraft movements originating or terminating from the north and east sides of the airfield.

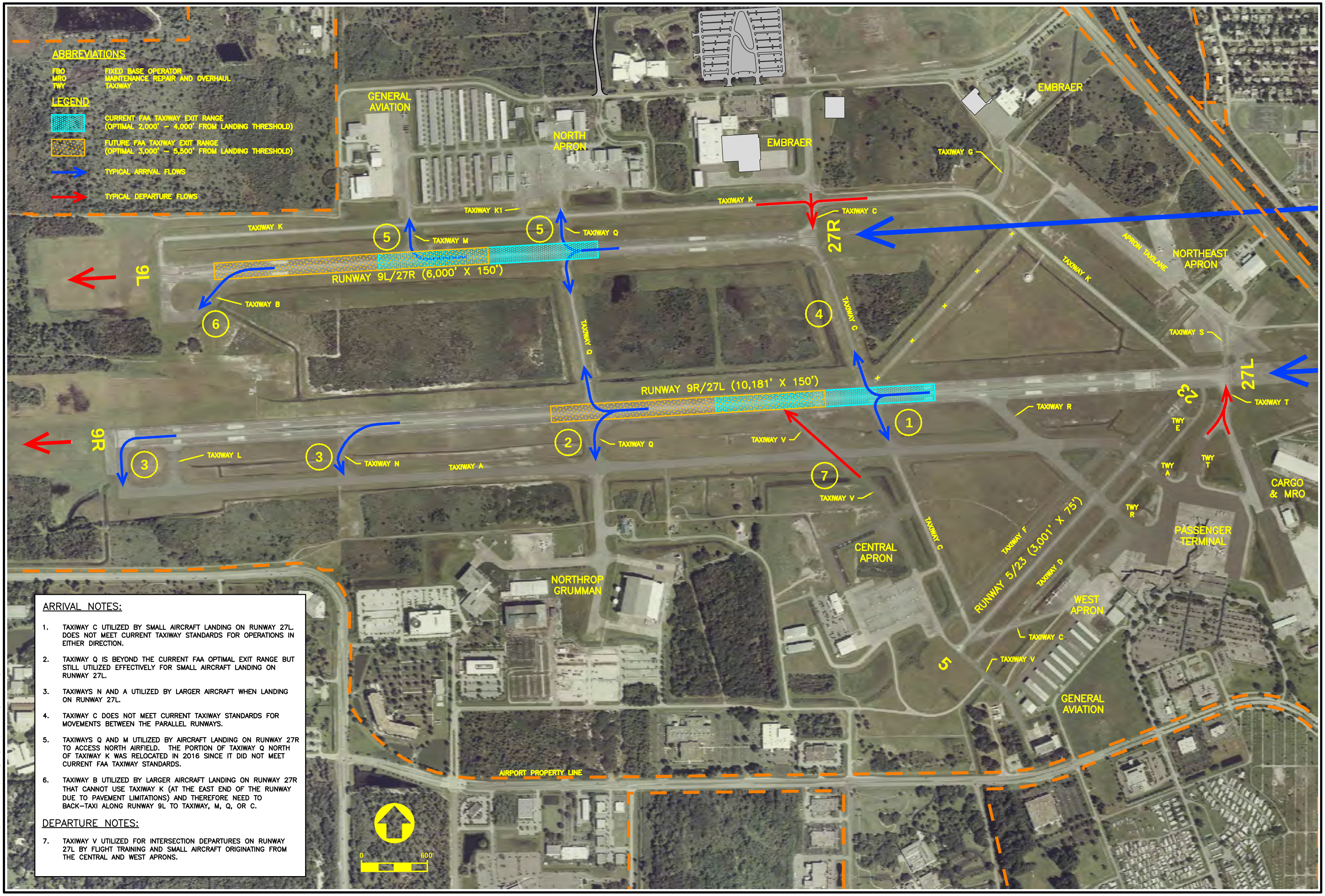
Figure 4-2 depicts both the current and future FAA taxiway exit ranges described previously as part of the capacity calculations. The primary observations include:

Arrivals

- Taxiway C utilized by small aircraft landing on Runway 27L. Does not meet current taxiway standards for operations in either direction.
- Taxiway Q is beyond the current FAA optimal exit range but still utilized effectively for small aircraft landing on Runway 27L.
- Taxiways N and A utilized by larger aircraft when landing on Runway 27L.
- Taxiway C does not meet current taxiway standards for movements between the parallel runways.
- Taxiways Q and M utilized by aircraft landing on Runway 27R to access north airfield. The portion of Taxiway Q north of Taxiway K was relocated in 2016 since it did not meet current FAA taxiway standards.
- Taxiway B utilized by larger aircraft landing on Runway 27R that cannot use Taxiway K (at the east end of the runway due to pavement limitations) and therefore need to back-taxi along Runway 9L to Taxiway M, Q, or C.

Departures

- Taxiway V utilized for intersection departures on Runway 27L by flight training and small aircraft originating from the Central Apron and West Apron areas.



Sep 18, 2017 - 10:19am C:\Users\ddcarlo\Documents\MLB\Drawings\Figures\MLB MP Figure 4-2.dwg

Source: ESA, 2016

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FIGURE 4-2

PARALLEL RUNWAY SYSTEM MOVEMENTS - WEST FLOW

4.2.5.3 Runway 5/23 Movements – East Flow

Figure 4-3 includes the typical aircraft arrival and departure movements for Runway 5/23 in both the east and west operational flows. Due to the length of Runway 5/23 and the separation distance to its parallel taxiways, use of this runway is restricted to small aircraft only (those with a maximum certificated takeoff weight of 12,500 pounds or less). Activity is normally limited to times when small aircraft require the runway alignment not to exceed their crosswind component or conversely; when training flights are looking to practice crosswind operations in actual conditions (within the aircraft's operating limitations). Therefore, most activity originates either from the Central Apron or West Apron areas, but can include activity coming from or going to the North Apron or Northeast Apron areas.

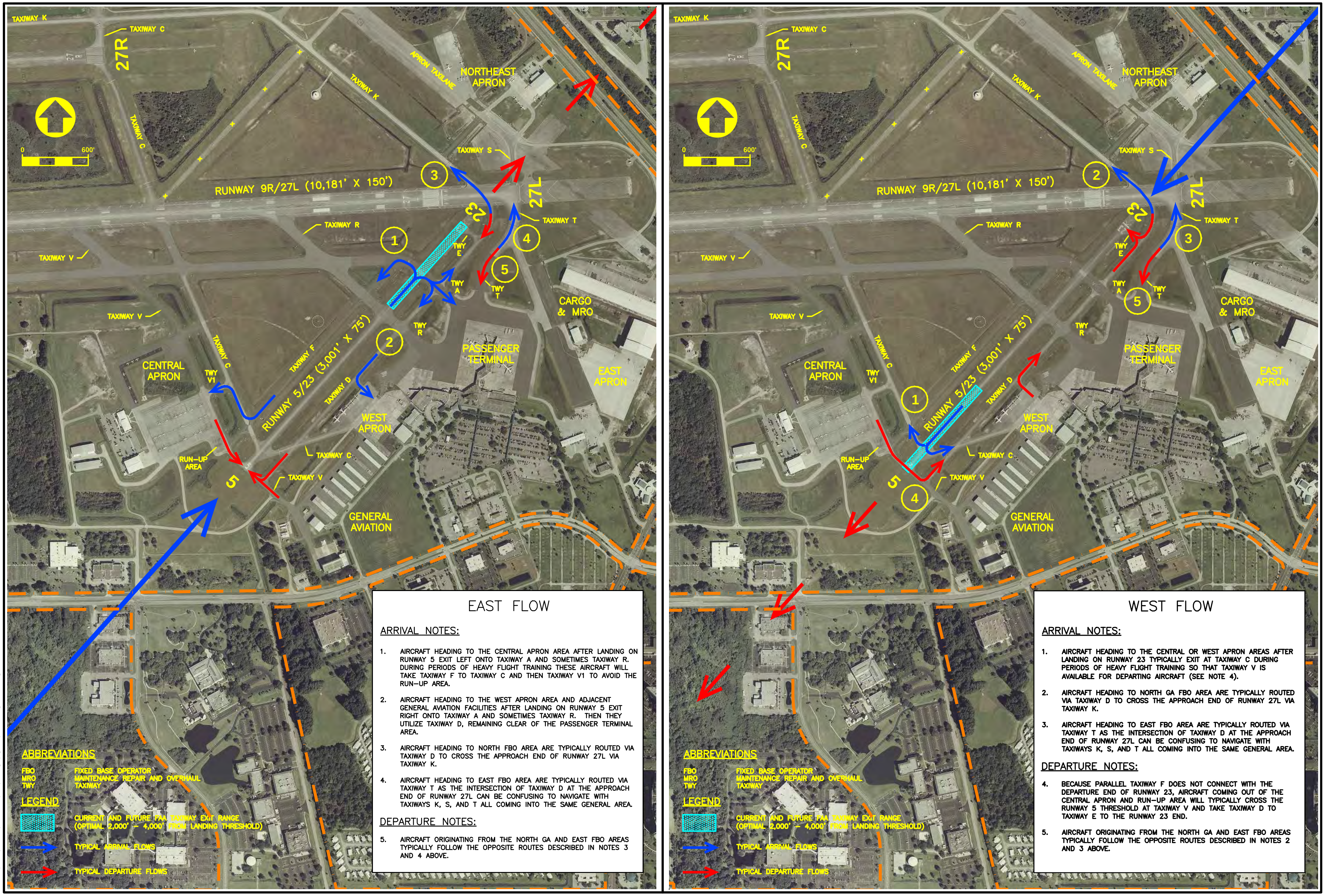
Figure 4-3 depicts the only FAA taxiway exit range that applies to both the current and future use of Runway 5-23. The primary observations related to the east flow include:

Arrivals

- Aircraft heading to the Central Apron area after landing on Runway 5 exit left onto Taxiway A and sometimes Taxiway R. During periods of heavy flight training these aircraft will take Taxiway F to Taxiway C and then Taxiway V1 to avoid the run-up area.
- Aircraft heading to the West Apron area and adjacent GA facilities after landing on Runway 5 exit right onto Taxiway A and sometimes Taxiway R. Then they utilize Taxiway D, remaining clear of the passenger terminal area.
- Aircraft heading to North Apron area are typically routed via Taxiway D to cross the approach end of Runway 27L via Taxiway K.
- Aircraft heading to the Northeast Apron area are typically routed via Taxiway T as the intersection of Taxiway D at the approach end of Runway 27L can be confusing to navigate with Taxiways K, S, and T all coming into the same general area.

Departures

- Aircraft originating from the North Apron and Northeast Apron areas typically follow the opposite routes described in the arrivals bullets above.



Source: ESA, 2016

FIGURE 4-3
RUNWAY 5/23 MOVEMENTS

4.2.5.4 Runway 5/23 Movements - West Flow

As noted, Figure 4-3 also includes the typical aircraft arrival and departure movements for Runway 5/23 in the west operational flow. The primary observations related to the west flow include:

Arrivals

- Aircraft heading to the Central Apron or West Apron areas after landing on Runway 23 typically exit at Taxiway C during periods of heavy flight training so that Taxiway V is available for departing aircraft (see first departure bullet below).
- Aircraft heading to North Apron area are typically routed via Taxiway D to cross the approach end of Runway 27L via Taxiway K.
- Aircraft heading to Northeast Apron area are typically routed via Taxiway T as the intersection of Taxiway D at the approach end of Runway 27L can be confusing to navigate with Taxiways K, S, and T all coming into the same general area.

Departures

- Because parallel Taxiway F does not connect with the departure end of Runway 23, aircraft coming out of the Central Apron and run-up area will typically cross the Runway 5 threshold at Taxiway V and take Taxiway D to Taxiway E to the Runway 23 end.
- Aircraft originating from the North Apron and Northeast Apron areas typically follow the opposite routes described in the arrivals bullets above.

4.2.5.5 Line Up and Wait Procedure

There were also discussions related to the ability for departing aircraft to utilize line up and wait procedures in order to facilitate the sequencing of aircraft departures during heavy peaks. When instructed by ATC, this procedure allows an aircraft to taxi onto the departure runway, line up on the centerline, and then wait for takeoff clearance. Many times the instruction from ATC to line up and wait will include an advisory of the reason why conditions do not allow for an immediate departure. The more obvious reason might include another aircraft which has just landed on or departed from the same runway. Less obvious reasons may include wake turbulence or traffic operating on an intersecting runway.

In general, these procedures require unmistakable communication and a high level of situational awareness from the pilots to be effective and safe. Given the high level of flight training activity (some of which by foreign student pilots where English is a second language); the mix of commercial service, GA, and military aircraft; and the parallel runway environment, ATC rarely uses line up and wait procedures at MLB. Conversely, management for FIT Aviation believes that line up and wait procedures would improve the congestion during heavy flight training peaks, particularly for Runway 9R when in an east flow. However, since ATC is responsible for the safe and efficient operation of the airport, they will continue to decide when and if line up and wait procedures are utilized.

4.2.6 Recommendations for Capacity Enhancement

As identified, some airfield capacity enhancements will need to be considered when the 60 percent capacity level is exceeded and before PAL-3 is reached. Examples of enhancements to increase the capacity of the runway system include additional runways, taxiways, instrument approaches, and/or operational procedures.

For MLB, the capacity improvements do not require an additional runway, rather how the existing three runways can be used more efficiently given the expected increase in activity and aircraft fleet changes. Likewise, while improved instrument approach capability could increase the utilization of the airport during actual instrument conditions, a significant majority of operations are conducted during visual conditions. The more realistic improvements would be to the taxiway system such as relocating runway exits, adding new runway exits, or constructing run-up areas to provide bypass options for departing aircraft.

4.2.6.1 Improved Taxiway Exits

The number of existing taxiway exits meeting the appropriate criteria for enhancing capacity were identified in Table 4-4. For the capacity calculations, this exit factor is maximized when there are at least two exits within the appropriate range. Therefore, the FAA methodology was rerun utilizing at least two taxiway exits for each runway end. The results illustrated that the overall airfield capacity could be increased, with the largest gains realized toward the end of the planning period when exits were added within the higher range of the aircraft mix index associated with PAL-3. However, the additional exits alone would still result in capacity figures over 60 percent by the end of the planning period (reference **Table 4-9**).

It should be noted that while Runway 9R/27L does meet the operational requirements for high-speed taxiway exits, none were considered a necessary facility requirement. Discussions with ATC management as part of the overall runway and taxiway flow analysis documented that the large aircraft utilizing Runway 9R/27L have no problems being able to exit the runway in an expedited manner. The few existing capacity issues noted for this runway are typically related to those times when smaller aircraft are trying to arrive or depart at the same time one of the larger aircraft operations occur. As such, the cost associated with one or certainly two high-speed exits (for operations in either direction) are not considered feasible.

4.2.6.2 Run-up Areas and Bypass Capability

Due to the level of flight training at MLB, consideration should also be given to ensure aircraft have access to a dedicated run-up area and/or bypass taxiway capability to increase the ability for aircraft to depart more efficiently. The Central Apron area includes two run-up areas but its bypass capability primarily benefits Runway 5/23 and to some extent Runway 9R/27L. While there is no mechanism in the FAA methodology to quantify this improvement, it does have the ability to increase overall capacity, especially during peak activity periods, and is addressed in a subsequent section.

4.2.6.3 Enhanced Simultaneous Operations

Based on the centerline spacing of the two parallel runways, MLB is only able to support simultaneous operations during VFR conditions. This is not a problem as the capacity issues expected in the future are not related to times when the airfield typically experiences instrument meteorological conditions. Rather, the future limitations are expected to be the result of an increase in the overall level of GA activity, especially those generated by touch and go training operations. While it was noted that this activity generally has less runway occupancy time, the ground flow and management of student training by ATC has limitations.

Due to the physical layout of the runway systems, Runway 5/23 cannot be utilized when the parallel runways are in a west flow. This is because any aircraft on approach to Runway 23 would cross and therefore conflict with the approaches to both Runways 27L and 27R. However, there have been occasions when ATC will utilize Runway 5 when the parallels are in an east flow. This gives the controllers the option to manage up to five or six training aircraft in the Runway 9L traffic pattern and two or three training aircraft in the Runway 5 traffic pattern. Departing traffic on Runway 5 is instructed to turn to the crosswind portion of the pattern as soon as possible, to avoid any conflict with the Runway 9L pattern. In between these two training patterns, the primary runway (Runway 9R) remains active, allowing ATC to sequence in any commercial service or larger GA aircraft. In the past, this enhanced simultaneous operations enabled controllers to safely manage days with very heavy flight training activity, including those in 2011 when FIT Aviation had the highest utilization rate of their fleet and MLB had the busiest FAA contract tower in the nation.

The additional airfield capacity created under this enhanced simultaneous operation was estimated with the FAA methodology by adjusting the runway use diagrams used. Changes included those which reflected the ability to use the north parallel and crosswind runway simultaneously while still providing the ability to sequence in operations on the primary runway when the airport is VFR and under an east flow. As before, this modified estimate also incorporated the advantages of maximizing the number of taxiway exits. The results are included in Table 4-9 below.

TABLE 4-9
ANNUAL SERVICE VOLUMES WITH RECOMMENDED IMPROVEMENTS

	Annual Operations	Improved Taxiway Exits (ASV)	Capacity Level	Enhanced Simultaneous Operations and Improved Taxiway Exits (ASV)	Capacity Level
Base Year					
2014	122,655	382,700	32%	447,500	27%
Planning Activity Level					
PAL-1	150,000	360,400	42%	405,800	37%
PAL-2	175,000	343,800	51%	391,800	45%
PAL-3	235,000	302,300	78%	353,200	67%

SOURCE: ESA, 2016.

Because these calculations are highly dependent on varying parameters such as the aircraft fleet mix or level of touch and go operations, an updated and more specific capacity analysis will be required between PAL-2 and PAL-3. Regardless, these figures help identify facility requirements that must be planned and programmed over the planning period of this study.

4.3 Runway Requirements

As the primary airfield component, a runway must have the proper length, width, and strength to safely accommodate the critical design aircraft. In addition to the physical characteristics of a runway, there are a number of other safety-related design standards that must be met, including the Runway Safety Area, Runway Object Free Area, Runway Protection Zones, and Obstacle Free Zones. Each of these, as well as other runway requirements for MLB, are described in the following sections.

4.3.1 Runway Length Analysis

AC 150/5325-4B, *Runway Length Requirements for Airport Design*, provides the current FAA standards and methods for computing recommended runway lengths. Use of this AC is required when a runway extension project is intended to request or receive federal funding. Different methods for calculating runway length are categorized by the maximum certificated takeoff weight groups of 12,500 pounds or less; over 12,500 pounds, but less than 60,000 pounds; and 60,000 pounds or more.

While the procedures and design rational vary depending on the weight category, each still requires some basic airfield data. For MLB these include the airfield elevation of 34.0 feet above mean sea level (AMSL) and the mean daily maximum temperature of the hottest month, which is 90 degrees Fahrenheit.

4.3.1.1 Length Required for Small Aircraft

Small aircraft are defined as those that have a maximum certificated takeoff weight of 12,500 pounds or less. The small aircraft group includes almost all single and multi-engine (piston and turboprop) aircraft, including those used for flight training at MLB. Charts in FAA AC 150/5325-4B require the local mean daily maximum temperature and airport elevation to determine runway length for small aircraft. These runway length curves have taken relative humidity and effective runway gradient into consideration, so no additional adjustments are required for the lengths derived.

There are different runway length curves depending on whether the small aircraft has fewer than or more than 10 passenger seats. This is due to the different operational requirements for aircraft with more than 10 passenger seats. Using the temperature and airfield elevation data for MLB, the resulting runway length requirement is 3,625 feet to accommodate every small aircraft with less than 10 passenger seats and 4,150 feet for those small aircraft having 10 or more passenger seats.

4.3.1.2 Requirements for Large Aircraft up to 60,000 Pounds

Using approved aircraft flight manuals, FAA AC 150/5325-4B provides performance curves to determine the runway length required for large aircraft weighing between 12,500 and 60,000 pounds. In addition to the mean daily maximum temperature and airport elevation, information on the useful load factor, effective runway gradient, and typical weather conditions are required.

Useful load refers to the difference between an aircraft's maximum allowable takeoff weight and the empty weight. As such, the useful load factor provides an indication of the amount of passengers, cargo, and fuel carried by an aircraft. In the FAA's charts there is an option to select a 60 and 90 percent useful load factor. Basically, the heavier the aircraft (higher useful load percentage) the more runway length required. Because of the airport's southeastern location within the nation, flights of 1,000 miles, 1,500 miles, or even longer (to get to the west coast) are common and occur on a regular basis. However, the largest jet aircraft within this weight group can fly even greater distances than coast to coast; therefore, both the 60 and 90 percent useful loads were calculated.

The FAA performance curves for jet aircraft weighing 12,500 to 60,000 pounds are also split into the categories of 75 and 100 percent of the fleet. FAA AC 150/5325-4B provides lists of the GA jet aircraft that represent 75 percent of the fleet flying in the U.S. This list combined with a second list represents 100 percent of the U.S. business jet fleet in this weight range. According to general statements in the AC, aircraft in the 75 percent group require a runway length up to 5,000 feet, while the remaining 25 percent require at least 5,000 feet, both for standard atmospheric conditions (59°F at sea level).

The FAA's 100 percent of the fleet table includes the larger Beechcraft Hawker, Bombardier Challenger, Bombardier Learjet, Cessna Citation, and Dassault Falcon series business jets. All of these aircraft conduct operations at MLB on a regular basis; therefore, the 100 percent of the fleet performance curves were analyzed. Applying local conditions to these performance curves yields an initial runway length requirement based on no wind, a dry runway surface, and zero effective runway gradient. These initial runway length requirements were 5,375 feet under a 60 percent useful load and 8,300 feet for the 90 percent useful load.

Adjustments are then made to these initial lengths for either takeoff or landing operations, but not for both, as the increases cannot be cumulative. Takeoff adjustments are based on the difference in centerline elevation of the runway being considered while landing adjustments are only made for runways serving jet aircraft operations. For jet runways the length is increased by 15 percent (up to a specified limit) to account for the decrease in landing performance under wet and slippery conditions. Since the initial takeoff lengths are adjusted for the effective gradient of a specific runway, the centerline elevation difference of Runway 9L/27R (8 feet) was applied as it accommodates aircraft in this weight range. After both takeoff and landing adjustments are considered, the final recommended length for large aircraft weighing between 12,500 and 60,000 pounds using Runway 9L/27R are 8,380 feet at a 90 percent useful load and 5,500 feet at a 60 percent useful load.

4.3.1.3 Specific Lengths for Aircraft Greater than 60,000 Pounds

Airport Planning Manuals (APMs) provided by the aircraft manufacturers are used for calculating specific takeoff and landing lengths of large aircraft over 60,000 pounds. Using the appropriate performance charts for the different aircraft model and engine configurations, the takeoff distances required at maximum certificated takeoff weight (MTOW) as well as for a typical short haul operation at MLB (reduced aircraft weight) were calculated. The APMs were also utilized to determine the landing distances required assuming wet surface conditions and under the maximum landing weight (MLW) for the aircraft.

While there are GA aircraft operating at MLB that weigh more than 60,000 pounds, most of the manufacturers of these aircraft do not publish APMs. Therefore, the lengths were calculated primarily for the (often more demanding) commercial service fleet. As described in the forecast chapter, these include the commercial passenger service, international charter, and all-cargo operations. However, calculations were made for the Airbus Corporate Jet (Airbus A320) and Boeing Business Jet (Boeing 737) GA aircraft since they are included in the manufacturers' APMs.

A draft of FAA AC 150/5325-4C, *Runway Length Requirements for Airport Design* was issued on August 5, 2013, but has yet to be approved. The primary difference in the revised methodology is that the aircraft manufacturers' APMs should be used for <u>all</u> aircraft groups over 12,500 pounds MTOW. To provide insight into specific aircraft needs, individual APMs were used for every commercial service aircraft greater than 12,500 pounds. For MLB, this included the APMs for the Canadair CRJ200 operating at the airport.

Runway Length Requirements for Maximum Certificated Takeoff Weights

The first step in evaluating the takeoff requirements for the commercial aircraft fleet operating at MLB calculated the runway length each aircraft requires when taking off at MTOW. Using airport temperature and elevation information, this determined the length required for unrestricted operations (i.e. no weight penalties for the aircraft operator). It should be noted that depending on the aircraft manufacturer, MTOW may also be referred to as the maximum takeoff weight or maximum design takeoff weight. Regardless, all of these represent the heaviest an aircraft can be at the start of its takeoff roll, due to strength and airworthiness requirements.

Within each APM, the manufacturer provides performance charts for the specific versions, configurations, and engine types of the aircraft model produced. Yet even commercial aircraft operators with a single type of aircraft in their fleet, typically have multiple versions of the same base aircraft model, each of which has specific performance requirements. This is especially true for the mainline carriers today as their current aircraft fleets are the results of different mergers.

During interviews with Delta Air Lines, American Airlines, and Elite Airways, this use of different models and engine configurations was confirmed. In addition, aircraft registration data for each airline was evaluated to understand the models and engine types of their respective fleets. The most common aircraft model and engine combination for each operator (shown in **Table 4-10**) was selected because they are likely to conduct a majority of the operations at MLB. The list includes

aircraft that are frequently substituted on the MLB route, such as the Boeing 737-700 and 757-200 aircraft operated by Delta Air Lines.

TABLE 4-10
TAKEOFF RUNWAY LENGTH REQUIREMENTS – MAXIMUM CERTIFICATED TAKEOFF WEIGHT (MTOW)

Critical Aircraft Model	Most Common Engine Type for Operators at MLB	Airport Reference Code(ARC)	Maximum Certificated Takeoff Weight (pounds)	Takeoff Runway Length (feet)
Commercial Passenger Service Fleet				
Canadair CRJ-200	GE CF34-3B1	C-II	51,000	6,600
Canadair CRJ-700	GE CF34-8C5	C-II	72,750	5,500
Canadair CRJ-900	GE CF34-8C5	C-II	84,500	7,000
Airbus A319-100	CFM56	C-III	166,449	7,100
Airbus A320-200	CFM56	C-III	171,961	7,600
Boeing 717-200	BR715 (21,000 pounds thrust)	C-III	118,000	5,600
Boeing 737-700	CFM56-7B26 (26,000 pounds thrust)	C-III	154,500	5,700
McDonnell Douglas MD-80-88	JT8D-217A	C-III	149,500	8,000
McDonnell Douglas MD-90-30	V2500-D5	C-III	156,000	7,500
Boeing 757-200	PW2037	C-IV	255,000	10,200
Boeing 737-800	CFM56-7B (26,000 pounds thrust)	D-III	174,200	8,200
International Charter Fleet				
Airbus A330-300	CF6-80E1	C-V	513,677	11,000
Boeing 757-300	PW2040	D-IV	270,000	10,500
Boeing 767-300ER	PW4062	D-IV	412,000	8,800
Boeing 787-800	GE or Rolls Royce	D-V	502,500	10,900
All-Cargo Fleet				
Boeing 757-200PF	PW2037	C-IV	255,000	10,200
Boeing 747-400F	CF6-80C2B1F	D-V	875,000	11,600
General Aviation Aircraft				
Airbus Corporate Jet (A320)	CFM56	C-III	171,961	7,600
Boeing Business Jet (B737)	CFM56-7B	C-III	171,000	7,300

SOURCE: Aircraft information from individual aircraft manufacturer Airport Planning Manuals and compiled by ESA, 2016.

Since most APMs have multiple MTOWs listed for a particular aircraft model and engine combination, the highest was selected for this portion of the analysis. However, if the aircraft included a high gross weight, long range, or extended range configuration, these were not selected to ensure consistency with the routes currently served in the MLB market. It should also be noted that the airline fleets serving MLB include some Airbus A319, Boeing 737, and Boeing 757 aircraft models with winglets (or sharklets in the case of Airbus). However, none of the APMs for these aircraft provide separate takeoff performance charts for models with winglets. In the case of aircraft

such as the Boeing 737-300 and 757-200/-200PF models, this is due to the fact that the winglets are aftermarket modifications. For the A319-100 and Boeing 737-700/-800 aircraft, winglets or sharklets are offered by the manufacturer, but Boeing only mentions them in their takeoff performance charts with the following note: "Non-Winglet Performance Shown. Winglet Aircraft Will Have Slightly Improved Performance."

Table 4-10 presents the final adjusted takeoff lengths using the MTOW of the commercial aircraft model and engine combinations. As per AC 150/5325-4B, the initial takeoff lengths were calculated using the APM performance charts for a dry runway with zero wind and zero effective runway gradient, and local conditions for MLB (i.e., temperature). The maximum difference of the Runway 9R/27L centerline elevation (11 feet) was used to adjust each for effective gradient. Even though this analysis will also be used to evaluate the length required for Runway 9L/27R (with a centerline elevation difference 8 feet), the Runway 9R/27L centerline elevations were used for the final adjustments as it is the primary commercial service runway and has a slightly higher effective gradient. Also per the FAA method, any runway lengths with 30 feet or more were rounded up to the next 100 foot interval.

Takeoff Length Requirements for Short Haul Operations

For federally funded projects, AC 150/5325-4B stipulates that the length of haul or range flown by the critical aircraft on a regular basis must also be considered when evaluating takeoff lengths. This is done by utilizing the payload-range charts in the APM to determine the operating takeoff weight for specific flight distances in nautical miles (NM). For longer haul routes, this operating distance would equal the MTOW with less useable payload allowed as the trip length (fuel required) increases. For the shorter trip lengths, the maximum payload (passengers or cargo) is allowed, since the lower fuel requirement typically keeps the aircraft below MTOW.

Currently the regularly scheduled non-stop passenger flights from MLB are to ATL – Hartsfield-Jackson Atlanta International (387 NM) and CLT – Charlotte Douglas International (429 NM) Airports. However longer non-stop flights to other hubs in either the Delta or American networks are anticipated to materialize. These future city pairs include Cincinnati, Detroit, Minneapolis, and New York for Delta and Dallas, Chicago, and New York for American. The distance from MLB to these cities ranges between 700 and 1,200 NM. Therefore, for the purposes of this analysis, an average trip length of 1,000 NM was used in the payload-range charts for each commercial service passenger aircraft. In selecting this average distance, it was presumed that none of the operators ferry fuel[3] on their flights departing MLB. While it is reasonable to assume the Airbus Corporate Jet and Boeing Business Jet might operate on much longer trip lengths than the regularly scheduled airlines, the 1,000 NM distance was also utilized to calculate a comparable short-haul distance for these GA aircraft.

When estimating the operating takeoff weight for a 1,000 NM trip, it was assumed that each aircraft would operate at the maximum design zero fuel weight (MZFW) before fuel was added. The MZFW represents the empty operating weight of the aircraft plus the maximum payload

3 The practice of taking on more fuel (therefore a higher takeoff weight) than required for a flight to avoid fueling times or costs at an intermediate stop before the next flight segment.

(passengers, baggage, and cargo) allowed. In other words, assuming MZFW means that no penalties would be imposed on the payload and the final takeoff operating weight would depend on the fuel required for the trip, plus any reserves. Unfortunately, the payload range charts in the APMs for the regional jet aircraft do not provide a complete set of curves to estimate the operating weight for different ranges at MZFW. Thus, only the 1,000 NM range operating weight and the corresponding runway takeoff length for the narrow-body and GA aircraft are included in **Table 4-11**. As before, these takeoff lengths include the adjustments made for effective gradient of Runway 9R/27L and rounding.

TABLE 4-11
TAKEOFF RUNWAY LENGTH REQUIREMENTS – SHORT HAUL OPERATIONS (1,000 NM)

Critical Aircraft Model	Most Common Engine Type for Operators at MLB	Airport Reference Code (ARC)	Operating Takeoff Weight (pounds)	Takeoff Runway Length (feet)
Commercial Passenger Service Fleet (narrow-body only)				
Airbus A319-100	CFM56	C-III	148,750	4,900
Airbus A320-200	CFM56	C-III	157,750	6,000
Boeing 717-200	BR715 (21,000 pounds thrust)	C-III	118,000	5,600
Boeing 737-700	CFM56-7B26 (26,000 pounds thrust)	C-III	140,300	4,900
McDonnell Douglas MD-80-88	JT8D-217A	C-III	146,900	7,600
McDonnell Douglas MD-90-30	V2500-D5	C-III	152,900	6,900
Boeing 757-200	PW2037	C-IV	215,900	5,800
Boeing 737-800	CFM56-7B (26,000 pounds thrust)	D-III	159,270	6,600
General Aviation Aircraft				
Airbus Corporate Jet (A320)	CFM56	C-III	155,600	5,700
Boeing Business Jet (B737)	CFM56-7B	C-III	145,500	5,100

SOURCE: Aircraft information from individual aircraft manufacturer Airport Planning Manuals and compiled by ESA, 2016.

No short-haul takeoff distances were calculated for either the international charter or the all-cargo aircraft. For the international charters, the routes expected include airports in the London, England area as well as airports in both Rio de Janeiro and Sao Paulo, Brazil. The non-stop trip lengths to airports in these city pairs are all around 3,800 NM, which with passengers, baggage, and fuel, would easily approach the MTOW for the international charter aircraft. Similarly, the all-cargo and largest maintenance aircraft would likely operate at or around the MTOW due to the nature of their operations. If the all-cargo aircraft are operated on shorter stage lengths, the operator would attempt to maximize the payload of each flight. For the larger aircraft coming to MLB for maintenance, such as the Boeing 747, many have originated from and departed back to international destinations, including Moscow and St. Petersburg, Russia, which can exceed the payload breakpoint for fuel alone, if no intermediate stop is planned.

Landing Length Requirements

FAA AC 150/5325-4B also provides the procedures for determining the required landing lengths. These are evaluated using the maximum allowable landing weight, or MLW, for each aircraft. Depending on the aircraft manufacturer, MLW may also be referred to as the maximum landing weight or maximum design landing weight. Nonetheless, each represent the maximum weight an aircraft can safely land based on its strength and airworthiness requirements.

The MLW for each aircraft evaluated was used with the corresponding APM landing chart that provided the highest landing flap setting for zero wind and zero effective gradient conditions. Depending on the aircraft manufacturer, some landing performance charts include curves for both dry and wet runway conditions. As per AC 150/5325-4B, wet runway conditions are required only for determining the landing length for turbojet aircraft. This includes all of the commercial aircraft serving or expected to serve MLB. For the APM landing charts without performance curves under wet conditions, AC 150/5325-4B recommends increasing the dry runway landing length by 15 percent. However, no adjustments for the effective runway gradient are made to landing lengths under the FAA methodology. The final landing lengths with the appropriate adjustment and rounding are included in **Table 4-12**.

TABLE 4-12
LANDING LENGTH REQUIREMENTS – MAXIMUM ALLOWABLE LANDING WEIGHT (MLW)

Critical Aircraft Model	Most Common Engine Type for Operators at MLB	Airport Reference Code (ARC)	Operating Takeoff Weight (pounds)	Takeoff Runway Length (feet)
Commercial Passenger Service Fleet				
Canadair CRJ-200	GE CF34-3B1 engines	C-II	47,000	5,700
Canadair CRJ-700	GE CF34-8C5 engines	C-II	67,000	5,900
Canadair CRJ-900	GE CF34-8C5 engines	C-II	73,500	6,300
Airbus A319-100	CFM56	C-III	137,789	5,400
Airbus A320-200	CFM56	C-III	142,198	5,600
Boeing 717-200	BR715 (21,000 pounds thrust)	C-III	102,000	5,400
Boeing 737-700	CFM56-7B26 (26,000 pounds thrust)	C-III	129,200	5,500
McDonnell Douglas MD-80-88	JT8D-217A	C-III	130,000	5,500
McDonnell Douglas MD-90-30	V2500-D5	C-III	142,000	6,100
Boeing 757-200	PW2037	C-IV	210,000	5,900
Boeing 737-800	CFM56-7B (26,000 pounds thrust)	D-III	146,300	6,700
International Charter Fleet				
Airbus A330-300	CF6-80E1	C-V	412,264	6,900
Boeing 757-300	PW2040	D-IV	224,000	6,500
Boeing 767-300ER	PW4062	D-IV	320,000	6,300
Boeing 787-800	GE or Rolls Royce	D-V	380,000	6,200
All-Cargo Fleet				
Boeing 757-200PF	PW2037	C-IV	210,000	5,900
Boeing 747-400F	CF6-80C2B1F	D-V	666,000	8,500

TABLE 4-12
LANDING LENGTH REQUIREMENTS – MAXIMUM ALLOWABLE LANDING WEIGHT (MLW)

Critical Aircraft Model	Most Common Engine Type for Operators at MLB	Airport Reference Code (ARC)	Operating Takeoff Weight (pounds)	Takeoff Runway Length (feet)
General Aviation Aircraft				
Airbus Corporate Jet (A320)	CFM56	C-III	142,198	5,600
Boeing Business Jet (B737)	CFM56-7B	C-III	134,000	5,700

SOURCE: Aircraft information from individual aircraft manufacturer Airport Planning Manuals and compiled by ESA, 2016.

4.3.1.4 Recommended Runway Lengths

The current runway lengths at MLB are 10,181 feet for Runway 9R/27L, 6,000 feet for Runway 9L/27R, and 3,001 feet for Runway 5/23. Because of these significantly different lengths as well as the widths and other capabilities, each runway serves a specific mix of aircraft. The recommended runway lengths for each are provided below.

Runway 9R/27L

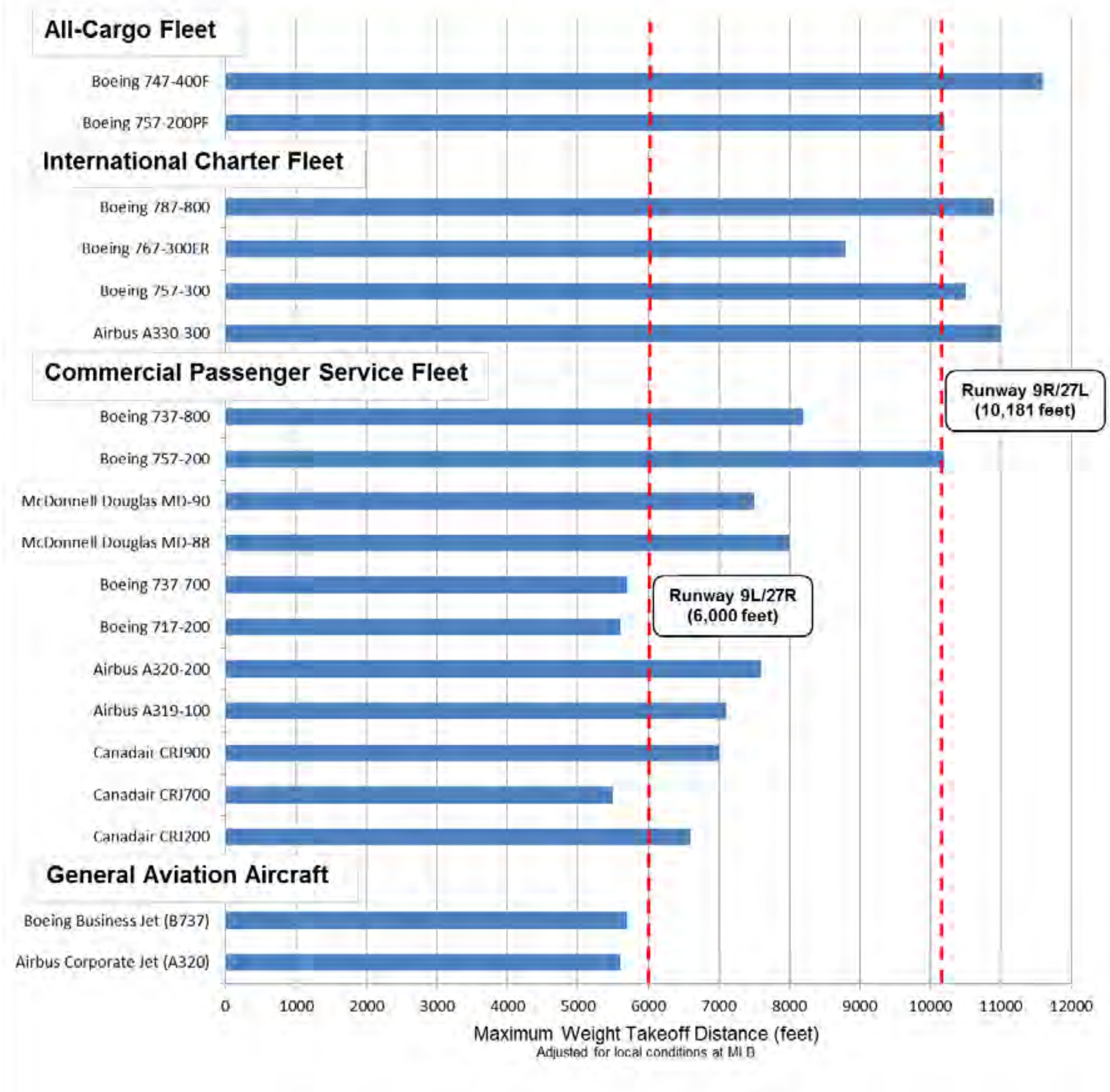
As MLB's primary runway, Runway 9R/27L needs to satisfy the landing and takeoff length requirements for all commercial, civilian, and military aircraft that use the airport on a regular basis. Under normal conditions and aircraft configuration, the runway should accommodate these aircraft with no restrictions related to operating weight (e.g., inability to depart the airport with desired number of passengers, fully fueled, and/or full load of cargo).

The current runway length accommodates most aircraft presently operating at MLB. However, some aircraft operators encounter operational limitations under certain conditions. This includes the Boeing 757-200s periodically used by Delta Air Lines and the increasing number of Boeing 747 aircraft operations associated with air cargo and MLB's heavy aircraft MRO facilities.

Many of the 200-series Boeing 757s operated by Delta are equipped with Pratt and Whitney PW2037 engines, which require more runway length than other engine options for the aircraft. While Delta does not regularly operate this aircraft on its MLB schedule, the airline does bring this aircraft to MLB. As more passengers choose MLB for their air travel needs, increased operations by this aircraft has the potential to increase. The Boeing 757 is also a very popular aircraft for all-cargo carriers. Similarly, the different Boeing 747 models that operate at MLB do not currently justify being the critical aircraft. However, heavy aircraft maintenance and air cargo operations at MLB by both Boeing 757 and 747 aircraft are expected to increase throughout the planning period. On the same note, the growth in international charter activity at MLB will include the use of large wide-body aircraft, such as the A330-300, Boeing 767-300, and Boeing 787-800, that have greater runway length requirements than the current fleet. Therefore, in the future, the Boeing 747-400F at MTOW is expected to be the most demanding aircraft with respect to runway length requirements. This is illustrated in **Figure 4-4**, which provides a graphic representation of the

runway length calculations from Table 4-10. The Boeing 747-400F is also expected to be the largest and heaviest aircraft using the airfield on a regular basis for PAL-2. As such, Runway 9R/27L should ultimately be able to provide 11,600 feet of usable length, in both directions, for departures.

FIGURE 4-4
Takeoff Distances for Aircraft Greater than 60,000 Pounds Operating or Projected to Operate at MLB



Source: Aircraft information from individual aircraft manufacturer Airport Planning Manuals and compiled by ESA, 2016

Runway 9L/27R

The existing length of Runway 9L/27R is adequate for the current level of activity at MLB. At 6,000 feet, this runway is capable of accommodating a majority of the medium to large business jet fleet that have a maximum allowable takeoff weight between 12,500 and 60,000 pounds. Yet, some of the large business jets aircraft may encounter operational restrictions when using this runway on hot days at MLB (see Figure 4-4). The same is true for the current commercial passenger airline fleet which could utilize the runway on an occasional basis. However, as the size and frequency of both the larger GA and commercial aircraft increase, an ultimate extension of the runway will be required. The extension should be planned such that the future arrival or departure of large aircraft is not impacted, especially given that ATC utilizes this runway for many of the large aircraft operators using the facilities on the north side of the airfield. An extension would facilitate the planned rehabilitation of the primary runway to ensure MLB can continuously provide the ability to accommodate the C-III aircraft of the commercial and general aviation fleets.

While the Boeing Business Jet was selected for the future critical aircraft for Runway 9L/27R, it may not be the most demanding in the future with respect to runway length. In fact, as shown in the previous tables, the Boeing Business Jet requires a takeoff distance of 7,300 feet at MTOW and 5,100 feet for a 1,000 NM trip, as well as a landing distance of 5,700. This range is less than the unadjusted numbers calculated for 100 percent of the large jet aircraft fleet up to 60,000 pounds using the FAA performance curves. As documented previously, once the initial takeoff lengths are adjusted for the effective gradient of Runway 9L/27R and the initial landing lengths adjusted for wet conditions, the final recommended lengths are 8,380 feet at a 90 percent useful load and 5,500 feet at a 60 percent useful load.

While Runway 9L/27R does not need to be able to accommodate the largest business jet aircraft or commercial fleet under every condition, it does need to be able to accommodate aircraft up through the 60,000-pound range as represented in the FAA’s 100 percent of the fleet curves. The average between the 60 and 90 percent useful loads is 6,940 feet; therefore, an overall length of 7,000 feet is recommended for Runway 9L/27R. When the expected increase in GA jet activity is considered, the additional runway length may occur between PAL-1 and PAL-2.

Runway 5/23

The FAA runway length curves for small aircraft resulted in a range of 3,625 to 4,150 feet for Runway 5/23, with the upper end of the range for those small aircraft with more than 10 passenger seats. While the future Beechcraft King Air B100 critical aircraft can be configured with more than 10 passenger seats, it is highly unlikely this aircraft would operate on Runway 5/23 with 10 or more passengers, more than 500 times a year.

However, the King Air B100 has a balanced field length of 3,050 feet. This length is published by aircraft manufacturers using the standard atmospheric conditions (59°F at sea level) on a flat and dry runway. While the elevation at MLB is only 33 feet AMSL, temperatures around 59°F generally only occur overnight, a few months of the year. For those times when more than 3,001 feet of runway is required by the larger B-I aircraft such as the King Air B100, they would likely use one of the longer parallel runways. In other words, while Runway 5/23 is required to meet the

crosswind component for aircraft up to the King Air B100, it is unlikely there would be enough departures requiring additional runway length and the crosswind coverage that is currently provided by Runway 5/23. Therefore, the current length of Runway 5/23 is adequate for the types of operations this runway supports.

4.3.2 Runway Width Requirements

Runway width requirements are based on the runway design standards (AAC and ADG) of the most critical aircraft. The existing and future requirements for each runway are listed in **Table 4-13** along with the corresponding runway shoulder width and blast pad dimensions.

TABLE 4-13
RUNWAY WIDTHS, SHOULDERS, AND BLAST PADS REQUIREMENTS

	Design Standards	Pavement Width	Shoulder Width	Blast Pad Width	Blast Pad Length
Existing					
Runway 9R/27L	D-IV	150’	25’ paved	200’	200’
Runway 9L/27R	D-II	100’	10’ stabilized	120’	150’
Runway 5/23	A-I	60’	10’ stabilized	80’	60’
Future					
Runway 9R/27L	D-V	150’	35’ paved	220’	400’
Runway 9L/27R	C-III	150’	25’ paved	200’	200’
Runway 5/23	B-I	60’	10’ stabilized	80’	60’

SOURCE: FAA AC 150/5300-13A, Change 1, *Airport Design* and ESA, 2016.

Runway 9L/27R is 150 feet wide and has no paved runway shoulders or blast pads. While technically the minimum runway width presently only needs to be 100 feet wide for the D-II critical design aircraft, the additional width should be maintained for the C-III RDC, especially given that Runway 9L/27R currently supports C-III aircraft operations. For the ultimate runway configuration (C-III RDC), the existing stabilized shoulders would be widened to 25 feet and paved. Because this runway is used by jet aircraft on a regular basis, it is recommended that paved blast pads be constructed at each runway end to prevent soil erosion.

Runway 5/23 is 75 feet wide with no paved shoulders and only a partial blast pads on the approach end to Runway 23. This pavement is 75 feet wide and 100 feet long, as it was previously part of the useable runway surface. While it is now marked with chevrons like a blast pad, it is slightly less than the 80 foot width required for blast pads to either A-I or B-I runways serving small aircraft exclusively. Nonetheless, no improvements are needed for the current or future conditions as the runway is not used by jet aircraft on a regular basis.

4.3.3 Runway Pavement Strength and Condition

Pavement strength requirements for each runway at an airport are predicated upon the critical aircraft's weight and how that weight is distributed through the landing gear. For Runways 9R/27L and 9L/27R, the current weight bearing capacities documented in the existing conditions chapter are less than those required by both the existing and future critical aircraft when at MTOW. However, these figures are considered to be somewhat conservative since they are not based on any recent testing of the actual pavement sections for the runways. These pavement strength ratings will be resolved with the pending need to rehabilitate both runway surfaces as described.

The Pavement Condition Index (PCI) provided for each runway in the existing conditions chapter was based on the April 2012 Florida Department of Transportation (FDOT) pavement evaluation report which included inspections conducted in January 2012. In June 2015, an update to the FDOT pavement evaluation report was issued based on inspections conducted in at MLB in March 2015. The 2012 information remains in the existing conditions chapter as it provides a point of reference as to how the pavement conditions have changed in three years. Using the same methodology, the 2015 ratings show all three runways requiring action instead of just Runway 5/23, as they are all now below the FDOT minimum service level threshold (PCI of 75) for runway pavements.

The 2015 FDOT pavement evaluation report shows Runway 9R/27L having an area weighted PCI of 63 and needs to be rehabilitated to address the overall Fair condition of the pavement. The low PCI was attributed to the age of the runway, structural (subsurface conditions), climate (sun and heat exposure), and construction quality of the pavement. As noted in the existing conditions, the airport has requested funding to rehabilitate sections of the runway and overlay the entire runway. If after the project the pavement design approved cannot accommodate the future critical aircraft (Boeing 747) at 875,000 pounds with a dual tandem landing gear configuration, then an additional pavement strengthening project may be required in the future.

Pavement requirements in the 2015 FDOT pavement evaluation report are nearly identical for Runway 9L/27R. This runway now has an area weighted PCI of 67 and also needs to be rehabilitated to address the overall Fair condition attributed to structural, climate/age, and construction quality of the pavement. For Runway 9L/27R, the airport has requested funding to mill and overlay the entire runway, including Taxiway B. Pavement design should ensure that the pavement strength can accommodate the future critical aircraft (Boeing 737) at 174,200 pounds with a dual landing gear configuration.

For Runway 5/23 the 2015 FDOT pavement evaluation report documented an area weighted PCI of 68. While the study recommends a mill and overlay project due to its overall rating, it also notes that the runway's intersection with Taxiways A and R have been rated with PCIs of 54 (Poor) and 57 (Fair), respectively. Given the runway is limited to small aircraft exclusively (less than 12,500 pounds MTOW), the current pavement strength of 26,000 for single landing gear configuration aircraft should be maintained when the pavement is rehabilitated. For the rehabilitation, consideration should be given to coordinate with the construction of the new ATCT. Due to its location, the new ATCT site will require that Runway 5/23 be temporarily closed since the

construction of the new tower will be a direct impact to the current ATCT line-of-sight to Runway 5/23.

Projects to rehabilitate runway pavements are routinely conducted every 15 to 20 years after the previous major rehabilitation, strengthening, or new construction. These projects, which repair damage to the runway pavement resulting from normal wear, need to be conducted even at airports with regular pavement maintenance programs, including crack sealing and surface seal coats. Recurring projects to maintain general airfield pavements need to be programmed for the planning period. Additionally, the FAA considers the grooving of any runway serving or expected to serve jet aircraft as a high safety priority. The decision whether or not to groove a runway can be made during the pavement design, to address the specific fleet mix needs using the particular runway at that time.

4.3.4 Runway Safety Criteria

The primary surfaces to protect aircraft operations include the Runway Safety Area, Runway Object Free Area, Runway Protection Zones, and Obstacle Free Zones. The FAA definitions for these surfaces are included below and each, as well as a number of others, are depicted on the Airport Layout Plan (ALP) drawing set:

Runway Safety Area (RSA) - A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overrun, or veer off the runway. The RSA needs to be: (1) cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations; (2) drained by grading or storm sewers to prevent water accumulation; (3) capable, under dry conditions of supporting the occasional passage of aircraft without causing structural damage to the aircraft; and (4) free of objects, except for those that need to be located in the safety area because of their function. It should be noted that the FAA does not allow modifications to any RSA standards.

Runway Object Free Area (ROFA) - The ROFA is centered on the runway centerline. Standards for the ROFA require clearing the area of all ground objects protruding above the RSA edge elevation. Except where precluded by other clearing standards, it is acceptable to place objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes and to taxi and hold aircraft in the ROFA. Objects non-essential for air navigation or aircraft ground maneuvering purposes are not to be placed in the ROFA. This includes parked airplanes and agricultural operations.

Runway Protection Zone (RPZ) – The RPZ is trapezoidal shaped area typically beginning 200 feet from the usable pavement end of a runway. The primary function of this area is to preserve and enhance the protection of people and property on the ground. While there is no vertical component, airports are required to maintain control of each runway's RPZ. Such control includes keeping the area clear of incompatible objects and activities. While not required, this control is much easier to achieve and maintain through the acquisition of sufficient property interests in the RPZs.

Runway Obstacle Free Zone (ROFZ) - The ROFZ is a three-dimensional volume of airspace centered on the runway that supports the transition of ground to airborne operations (or vice versa). The ROFZ clearing standards prohibit taxiing, parked airplanes, and other objects, except frangible navigational aids or fixed-function objects (such as signage), from penetrating this zone. Precision instrument runways also require an Inner-transitional OFZ and Precision OFZ. If there is an approach lighting system, then an Inner-approach OFZ is also required.

Dimensions of the required RSA, ROFA, RPZ, and ROFZ shown in **Table 4-14** are directly related to runway design standards (AAC and ADG) and visibility minimums. Because the current and future critical aircraft for each runway is within the same general group of aircraft and since there are no significant changes expected to the instrument approach minimums (addressed in a subsequent section), both the existing and future runway safety criteria will remain the same throughout the planning period. For Runways 9R/27L and 9L/27R, the 1,000 foot RSA and ROFA lengths are for the protection of takeoffs and reflect the space required beyond the departure end of the runway. For landing operations, the RSA and ROFA lengths only need to be 600 feet prior to the threshold.

TABLE 4-14
EXISTING AND FUTURE RUNWAY SAFETY CRITERIA

	Runway Safety Area	Runway Object Free Area	Runway Protection Zone	Runway Obstacle Free Zone
Runway 9R/27L	500’ wide 1,000’ beyond	800’ wide 1,000’ beyond	1,000’ x 1,750’ x 2,500’ (9R arrivals / 27L departures) 1,000’ x 1,510’ x 1,700’ (27L arrivals) 500’ x 1,010’ x 1,700’ (9R departures)	400’ wide 200’ beyond
Runway 9L/27R	400’ wide (existing) 500’ wide (future) 1,000’ beyond	800’ wide 1,000’ beyond	1,000’ x 1,510’ x 1,700’ (both ends)	400’ wide 200’ beyond
Runway 5/23	120’ wide 240’ beyond	250’ wide 240’ beyond	250’ x 450’ x 1,000’ (both ends)	250’ wide 200’ beyond

SOURCE: ESA, 2016.

All three runways have compliant RSAs and ROFZs. While both Runway 9L/27R and Runway 5/23 also have compliant ROFAs, there are a few vegetative obstructions to the ROFA for Runway 9R/27L. These obstructions were documented by the FAA Airports Geographic Information System (AGIS) data obtained at the onset of this Master Plan update as well as during a recent airfield inspection. Therefore, a project to remove as many of the obstructions needs to be programmed as soon as possible. For the existing RPZs, only the areas encompassed by the RPZs off each end of Runway 5/23 and Runway 27R are within the limits of airport property.

For Runway 9L, only a small portion on the north side of the zone extends beyond the current airport property line (approximately 1.4 acres), over an undeveloped area. For Runway 9R/27L,

portions of the RPZs extend beyond the current airport property line. At the approach end of Runway 9R, approximately 1.6 acres of the RPZ is located off-airport property. Land use within this area is public road right-of-way and a section of NASA Boulevard (a 4-lane road). On the Runway 27L end, approximately 2.1 acres of the RPZ is located off-airport property. Land use within this area includes rights-of-way for Apollo Boulevard and the Florida East Coast Railroad (two tracks). This is actually an Approach RPZ on this end of the runway, as it is located with the displaced threshold to Runway 27L. As indicated in Table 4-14, there is also a Departure RPZ which actually extends further east since it is based on the departure end of Runway 9R. This RPZ encompasses approximately 9.2 acres off-airport property, of which about 0.4 acres are shared with the Runway 27L Approach RPZ. In addition to the rights-of-way for Apollo Boulevard and the Florida East Coast Railroad, the land uses within this Departure RPZ also include two commercial buildings and five residences. Each RPZ extending off-airport property will be evaluated as part of the airport development alternatives with respect to the FAA's current guidance on compatible land uses within RPZs.

In addition to the ROFZ for Runways 9R/27L, an Inner-transitional OFZ and Precision OFZ are also required due to the precision approach with lower than ¾ mile visibility minimums. The Inner-transitional OFZ is based on the type of precision approach established and the most demanding wingspan of the critical aircraft for the runway. The Precision OFZ is a defined volume of airspace 800 feet wide and 200 feet from the threshold. Finally, an Inner-approach OFZ is required for any runway end where an approach lighting system has been installed. The Inner-approach OFZ begins 200 feet from the threshold (end of Precision OFZ) and extends 200 feet beyond the last light unit of the ALS. Its width is the same as the ROFZ and it rises at a slope of 50 (horizontal) to 1 (vertical) from its beginning.

4.3.5 Line-of-Sight Requirements

As part of the design and safety criteria, there are also two critical line-of-sight requirements that must be considered. The first is the Runway Visibility Zone (RVZ) which protects the proper line-of-sight between both existing and future runway configurations. A clear RVZ allows aircraft operating on the airfield to verify the location and movements of other aircraft and vehicles on the ground that could create a conflict. This zone must be kept clear of any fixed or movable objects (parked aircraft) at MLB since the ATCT does not operate 24 hours a day. The other line-of-sight requirement is directly related to the ATCT and the ability for the controllers to have an unobstructed view of all existing and future aircraft movement areas. In addition to other setbacks and imaginary surfaces, the ATCT line-of-sight is a critical element when considering the location and height of future airport facilities, as well as the location of future aircraft movement areas. All future ATCT line-of-sight calculations need to be based on the established eye height for the new ATCT which is 133 feet AMSL.

4.4 Taxiway System Requirements

Taxiway systems include parallel taxiways, entrance/exit taxiways, connector taxiways, apron taxilanes, hangar taxilanes, by-pass taxiways, and run-up areas. Circulation of the airport's future critical aircraft was utilized to establish the minimum taxiway system requirements for the three

runways. Some of the taxiway standards reflected in **Table 4-15** are based on the newer TDG while others still remain a function of the critical aircraft's ADG.

TABLE 4-15
MINIMUM TAXIWAY SYSTEM REQUIREMENTS

Taxiways Serving	Width	Safety Area	Object Free Area	Offset to Runway
Runway 9R/27L	75'	214'	320'	400'
Runway 9L/27R	50'	118'	186'	400'
Runway 5/23	25'	49'	89'	150'

SOURCE: ESA, 2016.

4.4.1 Taxiways

An overview of the individual taxiway design standards is provided in **Table 4-16** while the location for each are depicted in **Figure 4-5**. Since the last master plan update was conducted, the FAA has implemented new guidance on taxiways, primarily with respect to fillet design and layouts to enhance the safety of aircraft movements by minimizing the potential for runway incursions. In some instances, the future design criteria noted may change based on the final airfield development and therefore type of aircraft served by a taxiway. For those taxiways not meeting FAA standards, specific information is provided in the sections after the table.

The most recent weighted PCI condition rating and recommendations from the 2015 FDOT pavement evaluation report are also included. As with runway pavements, projects to rehabilitate the taxiways are routinely conducted every 15 to 20 years after the previous major rehabilitation, strengthening, or new construction. Therefore, rehabilitation projects for the taxiways not included in the FDOT 10-year major rehabilitation summary will be needed during the second half of the 20-year planning period.

TABLE 4-16
INDIVIDUAL TAXIWAY STANDARDS AND CONDITIONS

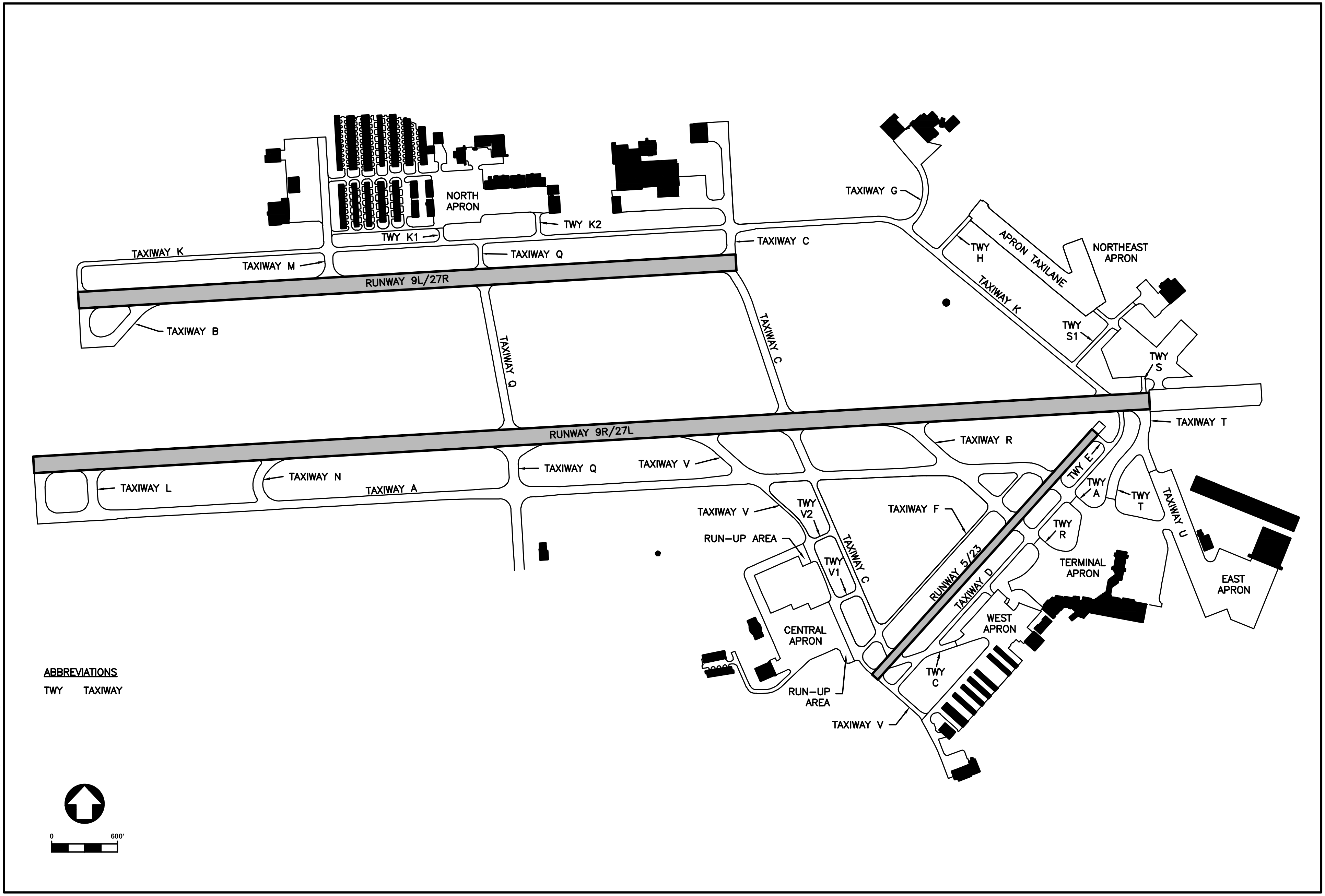
Taxiway		Existing TDG - ADG	Future TDG - ADG	Evaluate to Meet New Standards	2015 FDOT Weighted PCI	2015 FDOT Recommendation
A		5 – IV	5 – V		79	None
B		5 – IV	5 – V		81	None
C	North of Runway 9L/27R	5 – IV	5 – IV		78	Mill & Overlay
C	Taxiway A to Runway 9L/27R	5 – IV	5 – V	X	78	Mill & Overlay
C	South of Taxiway A	2 – II	3 – III	X	78	Mill & Overlay
D		2 – II	2 – II		74	Mill & Overlay
E		2 – II	2 – II		--	Not Included
F		1A – I	1A – I		100	Good

Taxiway		Existing TDG - ADG	Future TDG - ADG	Evaluate to Meet New Standards	2015 FDOT Weighted PCI	2015 FDOT Recommendation
G		3 – III	3 – III		94	Good
H		2 – II	3 – III	X	--	Not Included
K	East of Taxiway M	3 – III	3 – III		80	None
K	West of Taxiway M	2 – II	3 – III	X	80	None
K1		2 – II	3 – III		70	Mill & Overlay
K2		2 – II	3 – III	X	--	Not Included
L		5 – IV	5 – V		74	Mill & Overlay
M	North of Taxiway K	5 – IV	3 – III		75	Mill & Overlay
M	South of Taxiway K	5 – IV	5 – IV		75	Mill & Overlay
N		5 – IV	5 – V	X	90	None
Q	North of Runway 9L/27R	2 - II	3 – III		81	None
Q	South of Runway 9L/27R	5 – IV	5 – IV		81	Mill & Overlay
R		5 – IV	5 – V		85	None
S		2 – II	3 – III	X	65	Mill & Overlay
S1		2 – II	2 – II	X	89	Mill & Overlay
T		5 – IV	5 – V		83	None
U		5 – IV	5 – V		--	Not Included
V	North of Taxiway A	5 – IV	5 – V		90	Mill & Overlay
V	Taxiway A to Taxiway V1	1A – I	1A – 1		90	None
V	South of Taxiway V1	2 – II	2 – II		90	Mill & Overlay
V1		2 – II	2 – II		88	Good
V2		1A – I	1A – 1		100	Good

SOURCE: FDOT Statewide Airfield Pavement Management Program - June 2015 and ESA, 2016.

4.4.1.1 Taxiway C

The overall weighted PCI for Taxiway C is 78; however, there are different conditions found along the length of the taxiway. Rehabilitation of the portion between Runway 9R/27L and Runway 9L/27R as well as the portion between Runway 5/23 and Taxiway A was recommended by FDOT. While FDOT has not made any specific evaluations on the condition of Taxiway C between Runway 5/23 and the West Apron area, this section dates back to the World War II era and is in very poor condition. Depending on how the West Apron area, adjacent GA facilities, and other taxiways are developed, this section of Taxiway C should be removed and replaced with new connectors on both sides of Runway 5/23. This would allow Taxiway C between Taxiway D and Taxiway F to have the proper right angle intersections with Runway 5/23, to meet current FAA taxiway standards.



Source: ESA, 2016

FIGURE 4-5
EXISTING AIRFIELD PAVEMENT AREAS

The decision to improve the condition of Taxiway C between the parallel runways will depend on whether or not this portion is re-aligned to meet the newer taxiway standards. Currently the taxiway intersects Runway 9R/27L at an angle of approximately 74 degrees. This is the same for the connector portion between Runway 9R/27L and Taxiway A. It should be noted that if Taxiway C was re-aligned between Runway 9L/27R and Taxiway A, it would not create any significant operational improvements. Also, right angle intersections between the parallel runways and Taxiway A would impact the Taxiway V connector between Runway 9R/27L and Taxiway A. As described in the runway and taxiway flow analysis, Taxiway V is not used very often by aircraft landing on Runway 9R but is for intersection departures off Runway 27L. Since a re-alignment of Taxiway C would impact the portion of Taxiway V between Runway 9R/27L and Taxiway A, this project would serve to improve pilot visibility for the intersection departures on Runway 27L when the airfield is in a west flow. The advantages and disadvantages associated with the potential re-alignment will be considered in the analysis of airport development alternatives.

4.4.1.2 Taxiway D

While the weighted PCI for Taxiway D is 74, a full-length rehabilitation was recommended by FDOT as soon as possible because several portions of the taxiway currently have PCIs as low as 63 (Fair).

4.4.1.3 Taxiway H

Taxiway H is actually included as part of Taxiway S in the 2015 FDOT pavement evaluation report. This portion of the taxiway was designated with a PCI of 63 (Fair) and recommended by FDOT for rehabilitation as soon as possible. Taxiway H is also limited to TDG 2 due to its width of 40 feet. However, consideration needs to be given in the future development plans as to whether this taxiway needs to be increased to 50 feet in order to support TDG 3 and ADG III aircraft. As described in the section for Taxiway S, aircraft of this size currently use the Northeast Apron facilities and the portion of Taxiway S parallel to Taxiway K is currently designated as an apron taxilane, in a non-movement area. Therefore, plans to enhance Taxiway H may be necessary to support the expansion of aviation facilities on this side of the airfield.

4.4.1.4 Taxiways K, K1, and K2

While the condition of Taxiway K has a weighted PCI of 80, connector Taxiway K1 was recommended for rehabilitation as this connector only had a PCI of 70 (Fair) in the 2015 report. However, Taxiway K1 was relocated in 2016 as part of a project to address the non-standard portion of Taxiway Q north of Taxiway K. The same project also increased the width of the Taxiway K pavement from 40 to 50 feet between Taxiways C and M to provide full TDG 3 and ADG III taxiway standards along the parallel taxiway, including Taxiway K1. The only exception being that the centerline spacing between Runway 9L/27R and Taxiway K remains at 325 feet. This offset is not sufficient enough to support simultaneous ADG III operations along Runway 9L/27R and Taxiway K.

The portion of Taxiway K west of Taxiway M remains at 40 feet wide. A project to widen the remaining portion of Taxiway K is required so that TDG 3 aircraft using Runway 9L/27R do not

have to taxi along the runway between Taxiway M and Taxiway B. The need for Taxiway K2 to be widened from 40 to 50 feet will depend on how the North Apron is utilized in the future.

At the easternmost end of Taxiway K, the angle at which the taxiway intersects with Runway 27L does not meet the current FAA design standards. In February of 2013 the FAA evaluated whether the existing 45-degree angle between Taxiway K and Runway 9R/27L should remain or be reconfigured. This was part of the Phase 2 Taxiway K Widening project under FAA Airport Improvement Project (AIP) 39-2013. It was determined that it should not be changed because the intersection was not considered to be a problem (hot-spot) area or confusing to pilots and therefore, it was not feasible to change.

4.4.1.5 Taxiway L

FDOT has recommended rehabilitation of Taxiway L as it has a current weighted PCI of 74. However, the taxiway is not used very often, even when there are a number of flight training aircraft using Taxiway A to depart on Runway 9R. This coupled with the potential extension of Runway 9R/27L may eliminate the need to rehabilitate this taxiway. Additionally, because the centerline to centerline separation distance between Taxiway L and the current Taxiway A end connector is less than 750 feet, both cannot be considered as eligible taxiway exits with respect to minimizing runway occupancy time.

4.4.1.6 Taxiway M

Although the weighted PCI for Taxiway M is 75, the portion north of Taxiway K is in slightly better condition than the portion that connects to Runway 9L/27R. The north portion, which is constructed to a width for TDG 5, but limited to ADG IV due to the proximity of hangars, was recommended for rehabilitation. For the portion between Taxiway K and Runway 9L/27R, a rehabilitation is recommended sooner since this area has PCIs as low as 70 (Fair).

4.4.1.7 Taxiway N

As described in the runway and taxiway flow analysis, Taxiway N is utilized by small aircraft landing on Runway 9R when in an east flow and by some of the larger aircraft landing on Runway 27L when in a west flow. However, the taxiway does not meet current taxiway standards for operations in either direction. An evaluation of potential fillet changes for small aircraft exiting Runway 9R as well as potentially eliminating the continuous curve for aircraft exiting Runway 27L needs to be considered in the airport development alternatives.

4.4.1.8 Taxiway Q

The portion of Taxiway Q north of Taxiway K was removed in 2016. This eliminated the direct access to the airfield and therefore the possibility for an aircraft to inadvertently taxi directly to the runway environment from the aircraft parking apron.

While the weighted PCI for Taxiway Q is 81, the fillet area with Runway 9R/27L has a PCI of 72, which is at the low end of Satisfactory. Therefore, FDOT recommends this area be milled and overlaid. Additionally, while the portion of Taxiway Q between the parallel runways does not

make a right angle to the runway centerlines, it also does not deviate enough (approximately 83 degrees) to justify any re-alignment based on the new taxiway design standards alone.

The portion of Taxiway Q south of Taxiway A also has a lower PCI than the weighted average and is recommended for rehabilitation. While this portion of Taxiway Q is constructed to a width for TDG 5, it is limited to ADG IV due to the proximity of the Aircraft Rescue and Fire Fighting (ARFF) station.

4.4.1.9 Taxiway R

While this taxiway is at an approximate 45-degree angle with Runway 9R/27L, as noted in the runway and taxiway flow analysis, it is almost exclusively used by large aircraft exiting the runway. Therefore, the need to re-align it to the newer taxiway design standards is not considered a priority.

Taxiway R provides direct access to Runway 5/23 from the passenger terminal apron. The solution to this direct access would be to eliminate the portion of Taxiway R between Taxiway D and the passenger terminal apron. However, according to ATC management, this access point is almost exclusively utilized by the commercial passenger airlines accessing the passenger terminal apron. As noted in the Runway and Taxiway Flow Analysis, a Runway Incursion Mitigation (RIM) analysis was conducted at the FAA's request based on five incursions that had been documented at the intersection of Taxiway V and the Runway 5 threshold. No incursions have ever been documented for movements in the vicinity of Taxiway R and Runway 5/23. Eliminating the portion of Taxiway R between Taxiway D and the passenger terminal apron would eliminate the bypass capability for the commercial aircraft operating to/from the passenger terminal apron, which is provided via Taxiways A and R. In addition, there are five visual cues at the Taxiway R and Runway 5/23 intersection for pilots, including elevated wig-wag lights. Therefore, the removal of this section is not considered feasible or required from a safety standpoint. The Master Plan text has been updated to better address this issue.

Overall, the weighted PCI for Taxiway R is 85; however, the fillets with Runway 9R/27L have a PCI of 69 (Fair). FDOT recommends these fillet areas be milled and overlaid.

4.4.1.10 Taxiways S and S1

In the 2015 FDOT pavement evaluation, the weighted PCI of 65 for Taxiway S included all of Taxiway S as well as Taxiway H. The condition of Taxiway H was addressed previously while the portion of Taxiway S parallel to Taxiway K is actually designated as an apron taxilane in a non-movement area. This is due to the proximity of the airport's compass calibration pad. Regardless, a full-length rehabilitation was recommended by FDOT as soon as possible because several portions of the taxiway currently have PCIs as low as 55 (Poor). The portion of Taxiway S1 between Taxiway S and the Northeast Apron is also recommended for rehabilitation. Future development plans need to include the ability for Taxiway S and/or Taxiway S1 to support TDG 3 and ADG III standards at a minimum, as aircraft of this size currently use the East FBO facilities. Higher design standards may also be required depending on how the vacant areas along Apollo Boulevard are ultimately developed for aviation uses.

4.4.1.11 Taxiway V

While the weighted PCI for Taxiway V is 90, this taxiway has three different sections with respect to design standards as shown in Table 4-16. North of Taxiway A, the fillets of Taxiway V with Runway 9R/27L have a PCI of 70 (Fair); therefore, FDOT recommends these areas be milled and overlaid. However, the runway and taxiway flow analysis mentioned that Taxiway V is not used very often by aircraft landing on Runway 9R. It is used for intersection departures off Runway 27L, despite the fact that its acute angle with the runway does not provide the best visibility for aircraft entering Runway 27L. Therefore, the decision to improve the fillets will depend on whether Taxiway V will remain in its current alignment or be impacted by the re-alignment of Taxiway C to meet the newer taxiway standards.

No recommendations were made for the portion between Taxiways A and V1. However, the portion between Taxiway V1 and Runway 5/23 has a lower PCI than the weighted average and is recommended for rehabilitation. South of Runway 5/23, no recommendations were made as the condition of Taxiway V in this area was rated with a PCI of 94 (Good).

4.4.2 Apron and Hangar Taxilanes

Only a few of the various apron edge and T-hangar taxilanes were included in the FDOT pavement management evaluation. Pavement areas constructed as part of private leaseholds are not incorporated in the state's inventory and analysis. Those included are addressed in the following paragraphs.

On the north side, two taxilanes off the east side of Taxiway M connect to the taxilane system that serves the T-hangars and box hangars of the North Apron area. Only about 200 feet of these taxilanes were evaluated in 2015, with the northernmost rated with a PCI of 88 (Good) and the southernmost at 75 (Satisfactory). Only a rehabilitation of the southernmost taxilane was recommended and should be included as part of the similar project for the portion of Taxiway M, north of Taxiway K.

Around the north side of the Central Apron, the taxilane and run-up area have a PCI rating of 100 (Good) as it was constructed in 2013. On the south side the apron taxilanes and run-up area have a PCI of 80 (Satisfactory). Only a rehabilitation of the apron edge taxilane and run-up area on the south side of the Central Apron was recommended by FDOT.

To the south of Runway 5/23, the taxilanes that run along and in-between the T-hangars adjacent to the West Apron range from a PCI of 67 (Fair) to 94 (Good). The lowest ratings are located around the three T-hangars on the northeast end of this flightline. A project to rehabilitate the four taxilanes serving these T-hangars was recommended by FDOT. The need for this project will depend on the final configuration of the T-hangar buildings in this area.

4.4.3 New Taxiways and Taxilanes

The following sections address the need for new taxiways and taxilanes in order to support the activity projected in the aviation forecasts.

4.4.3.1 Parallel Taxiway

Currently MLB is sufficiently served by the parallel taxiway systems of each runway. However, the additional ADG III activity expected will eventually change the critical aircraft on the north side of the airfield. As documented, Runway 9L/27R has operational limitations due to the centerline to centerline spacing of 325 feet with Taxiway K. This does not allow unrestricted ADG III aircraft movements along the runway and parallel taxiway system without special procedures, rather the runway/taxiway system is limited to aircraft with the design components of B-III and D-II.

The RDC for Runway 9L/27R is C-III with the Boeing 737 representing both the GA as well as a majority of the commercial service passenger fleet that operate at the airport today. This designation requires a parallel taxiway offset at 400 feet, which cannot be provided on the north side of the runway due to the proximity multiple aircraft hangars. Therefore, a new parallel taxiway offset 400 feet to the south of Runway 9L/27R should be planned. This taxiway would be in alignment with the current Taxiway B geometry.

As noted in Table 4-16, Taxiway B currently provides TDG 5 and ADG IV standards. The future is shown increasing to ADG V standards, only because there are no improvements necessary to provide that designation if needed by the ADG V aircraft that use the runway for engine run-ups as part of a maintenance procedure or repair. However, when the need for a parallel taxiway with a 400 foot offset materializes, a decision will be made whether that taxiway is also required for the TDG 5 and ADG V standards, or if it would just need to support the Runway 9L/27R critical aircraft requiring TDG 3 and ADG III standards.

4.4.3.2 Additional Taxiway Exits

At least two connector taxiways within the appropriate exit range must be provided in order for a runway to have the lowest runway occupancy time for aircraft arrivals. These ranges were illustrated in Figures 4-1, 4-2, and 4-3 as part of the runway and taxiway flow analysis. With the current level of aviation activity, the airport has no problems with respect to capacity. However, towards the end of the 20-year planning period some delay may be experienced during peak periods that could be mitigated with improved taxiway exits.

Additional connector taxiways to maximize the appropriate exit range should be considered. While the existing and future exit ranges were included in Figures 4-1 and 4-2 for the parallel runway system, they should not be used to plan future additions. Rather, the appropriate exit ranges should be considered as part of the runway development alternatives, especially given that exits currently within the optimal exit range may change if one or both ends of a runway are extended.

4.4.3.3 West End Connector Taxiway

A new taxiway connecting the west ends of the parallel runways is recommended to reduce the congestion and improve safety. The north side of the airfield has seen an increase in both the level of aircraft operations and the size of aircraft from almost exclusively ADG I, II, and III aircraft to more movements by larger ADG IV and V wide-body aircraft. While it is expected that the larger

wide-body aircraft will continue to back-taxi along Runway 9L/27R, this is less than an ideal situation especially with the increasing volume of operations on this runway. Until a full length parallel taxiway can be constructed on the south side of Runway 9L/27R (Taxiway B), this connector on the west end of the parallel runways would help those larger aircraft while also providing the needed access to Runway 9R from the north side of the airfield for all aircraft, without having to cross the primary runway.

4.4.3.4 Access Taxilanes

Various taxilanes will be required to access future airfield facilities as they are developed. The final configuration will depend on the ultimate hangar sites and aircraft parking apron areas while the taxilane widths will be contingent on the intended use by different aircraft. The layouts of any additional taxiways and taxilanes will be included on the final ALP drawings.

4.4.3.5 Taxiway Designations

Recent projects to relocate, rehabilitate, or construct new connector taxiways (Taxiways K1, K2, S1, V1, and V2) have included the current recommended taxiway naming conventions from FAA Engineering Brief 89, *Taxiway Nomenclature Convention*. However, the ability to potentially rename portions of the various existing and future parallel taxiways will require significant analysis. Given the diverse mix of large commercial, all facets of general aviation (including heavy flight training), and military aircraft activity, a full airport signage plan is required. Such a study would evaluate all existing and future taxiways at the airport to determine how potential changes to the current designations might or might not benefit the overall safety of operations.

4.4.4 Run-up Areas

The FAA recommends providing holding bays or run-up areas when runway operations reach a level of 30 operations per hour. The activity forecasts showed that MLB conducted up to 60 operations during the peak hour in 2014, primarily due to the level of flight training activity. There are two large run-up areas off of Taxiway V at the north side and south side of the Central Apron area (see Figure 4-5). These enable the high concentration of student flight training aircraft coming out of this apron to conduct pre-flight checks before taxiing to either the parallel runway system (typically Runway 9R/27L) or Runway 5/23.

However, as runway and taxiway flow analysis indicated, there are times when the parallel runways are active in the east flow and departures off Runway 9R back up. It was also noted that both Taxiway L and “line up and wait” procedures are rarely used. For these reasons, an area at the west end of Taxiway A should be considered for a new run-up or bypass area to improve the sequencing of aircraft departures. The intent is not necessarily for traditional engine run-ups or preflight checks, rather to provide space which would allow aircraft to pass those that might not be ready for immediate departure.

A few considerations for such an area at the west end of Taxiway A include the ATCT line-of-sight, potential future extension of Runway 9R/27L, and proper spacing. The current ATCT has limited line-of-sight to the west end of Runway 9R/27 left. Therefore, any consideration for a

future run-up or bypass area needs to incorporate the line-of-sight from the relocated ATCT. As with the exit taxiways, the potential extension of Runway 9R/27L would change the siting for such an area. And finally, adequate space needs to be provided in order insure the run-up or bypass area can be designed for the proper aircraft, including a properly marked entrance and exit area to ensure wingtip clearance.

4.5 Instrument Approach Procedures

During times of inclement weather and/or reduced visibility, instrument approaches enable pilots to safely descend into the airport environment for landing. There are a number of different instrument approaches that can be established, each with specific limitations. While a description of the current instrument approach procedures was included as part of the existing conditions chapter, the following provides additional detail to the types and limitations of the approaches.

There are three categories for instrument approaches: precision approaches (PA), approach procedures with vertical guidance (APV), and non-precision approaches (NPA). All provide course guidance to the runway centerline they serve. The degree of horizontal guidance increases with the sophistication of the instrument approach established, which is reflected through the specific minimum operating parameters for each. The primary difference between the three is that non-precision approaches do not provide vertical guidance to the runway end. For both APV and PA approaches, the vertical course allows an aircraft to descend safely on a fixed glideslope signal, even when the runway environment is not yet in sight.

All instrument approaches have heights published that dictate how low a pilot can descend without the runway environment in sight before having to abandon the approach and try again. For most precision approaches this is called the decision height (DH) which is indicated in feet above the ground level. For non-precision approaches, it is referred to as the minimum descent altitude (MDA) and decision altitude (DA) for APV approaches with heights published in the number of feet above mean sea level. In addition, every instrument approach has minimum visibility requirements, measured in feet or miles. If visual identification of the runway environment cannot be made before the published minimums, then the aircraft must execute a missed approach and either try again or go to an alternate airport.

Because the heights for any published instrument approach are based on very detailed airspace analyses using FAA Order 8260.3B, *United States Standard for Terminal Instrument Procedures (TERPS)*, the visibility minimums determine the requirements for new procedures. There are typically three general groupings for the visibility minimums: not lower than one mile, not lower than ¾ mile, and lower than ¾ mile of visibility.

While instrument procedures are runway end specific, the authorization to establish any new approach begins with an Airport Airspace Analysis. The subsequent approval process of the ALP drawings created as part of this study will include an Airport Airspace Analysis conducted by the FAA to determine the ability of the runways to accommodate the desired instrument approach minimums proposed. When an actual instrument procedure is requested by the airport sponsor, all requirements, including the proper environmental review, desired approach minimums, whether

circling approach procedures are desired, the survey needed to support the procedure, and the approved ALP must be provided to the FAA. The following sections as well as other sections of this chapter discuss these requirements, which are also reflected on the final ALP drawing set.

4.5.1 Precision Approaches

PAs are defined as any approach that has visibility minimums lower than ¾ of a mile and the capability of safely guiding aircraft down to heights less than 250 feet above the threshold. Only Runway 9R provides precision approach capability. The primary PA is via the runway-specific Category I Instrument Landing System (ILS). Additionally, a precision area navigation (RNAV) procedure based on Global Positioning Satellites (GPS) and the Wide Area Augmentation System (WAAS) has been established to Runway 9R. The WAAS receivers improve the GPS capability to the point where approach minimums are comparable to the traditional Category I ILS without the need or expense of the runway specific equipment. More specifically, the improved WAAS performance allowed the FAA to develop LPV approaches (localizer performance with vertical guidance).

The setbacks required for these approaches take up a large amount of space on all sides of the runway, especially the approach surface required prior to the precision runway end threshold. Because one or both Runway 9R/27L thresholds would change as a result of the proposed runway extension, the development alternatives for that project must consider the various surfaces, including the Inner-approach OFZ and Precision OFZ. Other considerations when evaluating the need to relocate the precision instrument runway threshold include the runway lighting, pavement markings, full length parallel taxiway, and the approach lighting system.

FAA AC 150/5300-13A, Change 1 requires a Vertically Guided Survey for any new or relocated precision instrument approach; which among other things helps to determine the lowest possible minimums for the proposed approach. Information pertaining to the details of this survey requirement is found in FAA AC 150/5300-18B, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*. Essentially, this AC provides the specifications for the collection of airport survey data through field and office methodologies to support the aeronautical and airport engineering information required.

4.5.2 Approach Procedures with Vertical Guidance

Approach procedures with vertical guidance (APV) are defined as any approach that has visibility minimums not lower than ¾ of a mile and the capability of safely guiding aircraft down to heights greater than or equal to 250 feet above the threshold. Runways 9R, 27L, 9L, and 27R each have a published LPV RNAV/GPS procedure. These are all designated as APVs because they have ¾ mile visibility minimums; however, Runways 9R, 27L, and 27R were established with a DA of 200 feet above the threshold. This is lower than the typical DA associated with an APV and as per FAA AC 150/5300-13A, Change 1, these approaches are required to comply with the same airport landing surface standards of a PA. Additionally, the ¾ mile visibility minimums necessitated some

significant increases in the size of the RPZs and the 14 CFR Part 77 Imaginary Surfaces described in the following section.

It is assumed that the lower DA for the APVs to Runways 9R, 27L, and 27R are due to the TERPS analysis conducted by the FAA when the approaches were established. However, the ¾ mile visibility minimum APVs to both ends of Runway 9R/27L and both ends of Runway 9L/27R were not coordinated with the airport when they were established. In fact, discussions with the airport and FAA Orlando Airports District Office (ADO) could not produce any documentation related to the analysis associated with the four LPV RNAV/GPS approaches with ¾ mile visibility minimums.[4]

For Runway 9R/27L, the ¾ mile APV approaches do not require any changes related to the immediate runway design and safety surfaces since it is the primary instrument runway with the Runway 9R ILS. However, the required Approach RPZ associated with the displace threshold for approaches to Runway 27L extends off-airport property. As described previously, this will be evaluated as part of the airport development alternatives to determine whether any future changes to these existing RPZs would create any new non-compatible land uses with respect to the current FAA guidance. If this RPZ and the other required imaginary surfaces specific to this approach into Runway 27L are clear, it may be possible to reduce the associated visibility minimums through the addition of an ALS and/or qualify this approach as a PA. This too will be explored in the evaluation of alternatives.

For Runway 9L/27R the required RPZs and 14 CFR Part 77 Imaginary Surfaces (described in the next section) will need to be evaluated since no documentation could be found related to the airspace analysis conducted for the establishment of these approaches. These larger surfaces will likely result in a number of the existing and future facilities along the north parallel runway flightline to be considered an obstruction. In fact, the 7:1 Transitional Surface coming off the required 1,000 foot wide Primary Surface encompasses 11 existing hangars north of Runway 9R/27L. Therefore, the ability to maintain the ¾ mile APV approaches to both ends of Runway 9L/27R will be analyzed in the airport development alternatives.

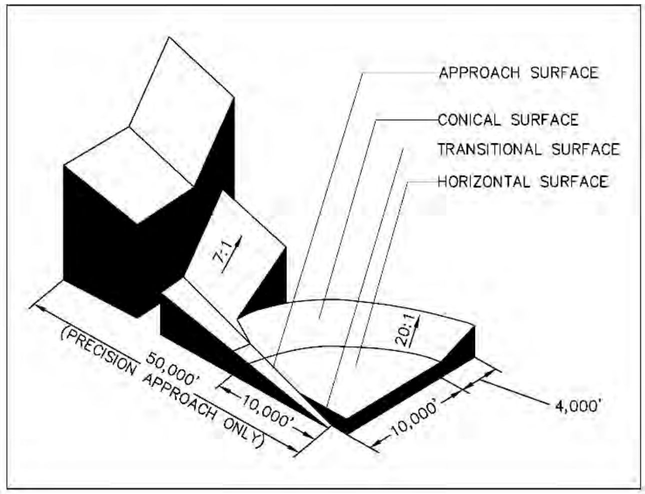
As with the precision approach to Runway 9R, if any of the other parallel runway end thresholds change as part of the airfield development, a Vertically Guided Survey will need to be conducted in accordance with FAA AC 150/5300-18B to re-establish the APV approaches, even if their minimums are reduced.

[4] The fact that documentation was not available for review in this Master Plan does not imply that the required analyses were not performed when the Instrument Approach Procedure was developed.

4.5.3 14 CFR Part 77 Imaginary Surfaces

The airspace around airports is protected by the imaginary surfaces defined in Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. When combined, the five different imaginary surfaces of this federal regulation protect airspace and the ability for aircraft to safely fly into and out of an airport. These surfaces are incorporated into the City of Melbourne's planning and land use ordinance to control the height of objects in the vicinity of the airport. These specific imaginary surfaces, which identify obstructions, are described in the following sections below and illustrated in **Figure 4-6**.

Figure 4-6: 14 CFR Part 77 Imaginary Surfaces



4.5.3.1 Primary Surface

A rectangular area symmetrically located about each runway centerline and extending a distance of 200 feet beyond each paved runway threshold. Width of the Primary Surface is based on the type of approach a particular runway has, while the elevation follows, and is the same as that of the runway centerline, along all points. The width for the parallel runways is 1,000 feet for either a precision approach and/or any non-precision approach with visibility minimums as low as ¾ of a mile. Since Runway 5/23 is not capable of accommodating aircraft greater than 12,500 pounds it is designated as a utility runway in 14 CFR Part 77. The Primary Surface width for utility runways having only visual approaches is 250 feet.

4.5.3.2 Horizontal Surface

A level oval-shaped area situated 150 feet above the established airport elevation, extending 5,000 or 10,000 feet outward, depending on the runway category and approach procedure available. For both parallel runways the Horizontal Surfaces will have a radius of 10,000 feet. For Runway 5/23 the radius is 5,000 feet since it is utility and only has visual approaches.

4.5.3.3 Conical Surface

Extends outward for a distance of 4,000 feet beginning at the outer edge of the Horizontal Surface, and sloping upward at a ratio of 20:1.

4.5.3.4 Approach Surface

These surfaces begin at the end of the Primary Surface (200 feet beyond paved runway thresholds) and slope upward at a ratio determined by the runway category and type of instrument approach available to the specific runway end. The width and elevation of the inner end conforms to that of

the Primary Surface while Approach Surface width and length to the outer end are governed by the runway category and instrument approach procedure available.

For the Runway 9R precision approach, the Approach Surface extends out 10,000 feet at a slope of 50:1 and then an additional 40,000 feet at a slope of 40:1 to an outer width of 16,000 feet. For Runways 27L, 9L, and 27R the current Approach Surfaces extend out 10,000 feet at a slope of 34:1 to an outer width of 4,000 feet. This is based on the non-precision approaches with ¾ mile visibility standards. For both ends of Runway 5/23, the Approach Surfaces extend out 5,000 feet at a slope of 20:1 to an outer width of 1,250 feet (utility runway with only visual approaches).

4.5.3.5 Transitional Surface

A sloping area beginning at the edges of the Primary and Approach Surfaces and sloping upward and outward at a 7:1 slope.

4.6 Airfield Environment

A number of facilities are necessary to support the operations of the airfield environment. Airfield lighting is required for airports intended to be utilized for nighttime operations as well as for operations during less than visual meteorological conditions. These along with pavement markings, signage, and other navigational aids are addressed in the following sections.

4.6.1 Runway Lighting

Runway 9R/27L has High Intensity Runway Lights (HIRLs) to support the Runway 9R precision approach with Runway Visual Range (RVR) based minimums. The runway edge lighting system also includes touchdown zone and centerline lights for approaches to Runway 9R. Both Runway 9L/27R and Runway 5/23 have Medium Intensity Runway Lights (MIRLs) which are required on most runways with non-precision or precision instrument approaches. Since RVR based minimums are not expected to be a part of any future GPS precision approach at MLB, the existing MIRLs will support the changes to any instrument procedure planned for Runway 9L/27R and the visual approaches to Runway 5/23 at night.

Both ends of the parallel runways have caution zone lights in support of the instrument approach procedures to each runway end. The caution zone is created by changing the white lens on the fixtures within the last 2,000 feet of the runway ends. The lights in this range are replaced with split lens so that they emit yellow light along the last 2,000 feet of usable pavement for the landing rollout. The other half is still white for the approach or takeoff end of the runway. The caution zone will need to be adjusted based on the ultimate lengths of the parallel runways. Likewise, any future runway lighting changes due to moving thresholds will need to maintain or include eight threshold lights to support the instrument approaches.

Each runway lighting system consists of base-mounted incandescent light fixtures on cans with conduit. While the cans and conduit are in good condition, the fixtures and a number of transformers require replacement, particularly for the Runway 9R/27L and Runway 5/23 circuits. In the future, light-emitting diode (LED) runway lights should be considered as part of the next

major pavement rehabilitation or if the runway is extended. Not only would the LED lights be more efficient, but they will also eliminate the drop in electrical current experienced on some of the longer lighting circuit homeruns. In addition, extra electrical conduits should be installed with each major runway project to provide flexibility for future airfield electrical runs, without the need to trench and patch existing pavement structures.

4.6.2 Taxiway Lighting

Each taxiway has Medium Intensity Taxiway Lights (MITLs) with base-mounted fixtures on cans with conduit. A majority of the taxiway lighting systems are LED but a few incandescent circuits still exist. While the cans and conduit are in good condition, the fixtures and transformers need to be replaced on a regular basis. This is true for even the newer LED systems due to problems with corrosion. Replacement of these and the older incandescent systems needs to be included with each future taxiway improvement project. In addition to new taxiways, this also includes any segments that are changed to meet the new safety standards, such as the reconfiguration of intersections and/or fillets.

4.6.3 Pavement Markings

Airport pavements are marked with painted lines and numbers in order to aid in the identification of the runways from the air and to provide information to the pilot during the approach phase of flight. The FAA classifies three marking schemes depending on the type of runway:

Visual – minimum requirement for landing designator markings and a centerline stripe.

Non-precision – minimum requirement for landing designator markings, a centerline stripe, and threshold markings.

Precision - minimum requirement for landing designator markings, a centerline stripe, threshold markings, aiming point markings, touchdown zone markings, and edge markings.

The non-precision group includes runways with vertical guidance but not lower than ¾ mile visibility minimums. Depending on the type of aircraft activity and physical characteristics of the pavement, additional markings may be required for visual and non-precision runways.

Runway pavement and displaced threshold markings are painted white, while taxiway pavement markings are painted yellow. FAA guidelines state that all taxiways should have centerline markings and runway holding position markings whenever they intersect with a runway. Many surface markings on light-colored pavements require glass reflector beads and need to be outlined in black paint without beads to enhance their conspicuity. This is true for all Portland Cement Concrete (PCC) surfaces and older asphalt pavements. In as little as two years, many asphalt surfaces (new or treated) can become 'light-colored pavements,' especially in Florida. Therefore, glass beads and black outlines should be considered for every future pavement marking.

4.6.3.1 Runways

Currently Runway 9R/27L has the proper markings for a precision instrument runway and also includes runway shoulder markings outside the edge markings to delineate the paved shoulder

areas. These shoulder markings are painted yellow, not white like the other runway markings. No additional markings are required for this runway.

Runway 9L/27R has the proper markings for the non-precision requirement, plus the addition of aiming point markers. These aiming point markers are required on instrument runways when the length is 4,200 feet or greater. In the future, when paved shoulders are added to accommodate ADG III aircraft on Runway 9L/27R, both edge markings and shoulder markings will be required. Additionally, when blast pads are constructed off each runway end, they will need to be marked with the proper configuration of yellow chevrons.

Runway 5/23 has the proper markings for a visual runway. No other markings are required since the runway only serves small aircraft, is less than 4,200 feet, and does not have any instrument approaches.

Once redone, runway markings typically last for ten years; however, there are a number of variables that could significantly shorten that period. Therefore, periodic remarking will be required.

4.6.3.2 Taxiways and Taxilanes

With the current precision approach and RDC designation of D-IV-2400, any taxiway serving Runway 9R/27L requires the holding position markings to be offset 250 feet, perpendicular to the runway centerline. This will change to 280 feet once the RDC designation becomes D-V-2400. Currently all of the holding position markings for those taxiways connecting to Runway 9R/27L are offset at least 280 from the runway centerline. The instrument approaches to Runway 9L/27R with both the current and future critical aircraft require the holding position markings to be offset 250 feet, while those for Runway 5/23 only need to be offset 125 feet. Each of the connector taxiways serving these two runways have properly offset holding position markings.

All of the taxiways at MLB currently have enhanced taxiway centerline markings, prior to the holding position markers. These markings are required for all 14 CFR Part 139 airport taxiways that lead to a runway holding position marking to improve situational awareness and minimize the potential for runway incursions. For consistency, this is applied to all taxiways and therefore needs to be included as part of any future taxiways connecting directly to a runway.

Clearly the various taxiways will be remarked as each is rehabilitated in the future. While these markings require centerline stripes; edge markings are only required in those areas with a large pavement area to differentiate the limits of the taxiway surface. Any new taxiways, taxilanes, or aprons should also have the appropriate centerline and holding position markings required by the FAA. And as with the runway pavements, periodic remarking will be required at least once during the course of the planning period.

4.6.4 Airfield Signage

Currently the airfield has a number of illuminated signs installed as part of the various runway and taxiway lighting circuits. The signs consist of many different types and are in fair to poor condition. A project to replace the existing airfield signage with LED units is required versus trying to retrofit

the older units. In the future, the inclusion of lighted airfield signage is required for any future taxiway in order to maintain the efficient and safe movement of aircraft to and from the runway environment. Typically, these are placed on the left side of the taxiway but can be located on the right when necessary to meet clearance requirements or if is it just impractical on the left side. Any new fixtures should also be LED units.

Runway distance remaining signs are located on the left side of both Runways 9R and 9L to provide pilots with a quick reference on the length available for takeoff or landing operations. Since these have been installed on the left side of the runways for the more frequent east flow operations, the signs also double-faced panels to serve operations in a west flow. Adjustments to the runway distance remaining signs will need to be included as part of any project changing the runway length or a landing threshold location.

4.6.5 Takeoff and Landing Aids

Over the course of the planning period, new takeoff and landing aids will need to be installed as well as some existing equipment replaced. The following sections describe these systems.

4.6.5.1 Precision Approach Lighting Systems

The ALS, installed as part of the precision approach to Runway 9R, is a Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). A MALSR is required for precision approaches which have decision heights as low as 200 feet and visibility minimums less than ¾ of a mile. The MALSR has light stations positioned symmetrically every 200 feet from the runway threshold out along the extended centerline for an overall distance of 2,400 feet. In addition to threshold lights, 5-unit light bars, and sequencing flashing lights, the MALSR also has a decision bar at 1,000 feet (three 5-unit light bars) from the runway threshold to serve as a visible horizon to ease the transition from instrument flight to visual flight.

As indicated previously, there is not a sufficient enough need to convert any of the three APV approaches (Runways 27L, 9L, and 27R) to a PA approach, as doing so would require the installation of a MALSR system. The current MALSR will however need to be relocated with any shift or change in the Runway 9R threshold associated with the ultimate need to extend the associated runway. Therefore, the alternatives evaluating the potential runway extension options need to consider the Inner-transitional OFZ and Precision OFZ surfaces described in the runway safety criteria section.

4.6.5.2 Runway End Identification Lights

Runway End Identification Lights (REIL) consist of a pair of synchronized white flashing lights which are situated on each side and abeam of the runway end threshold lights. They provide pilots with a rapid and positive visual identification of the approach end of the runway during night, instrument, and marginal weather conditions. REILs also aid in identification of the runway end in areas having a high concentration of lighting or areas that lack contrast with the surrounding terrain.

Unidirectional REIL systems have the beam axis orientated 15 degrees outward from a line parallel to the runway edge and inclined at an angle of 10 degrees upward, facing the approaching aircraft. Unidirectional REILs are installed for the displaced threshold of Runway 27L but are not required for Runway 9R given the MALSR system. Because of the amount of light that comes from the Melbourne community surround the airport property, unidirectional REILs should be included to both ends of Runway 9L/27R as part of the potential extension or next major lighting project for that runway.

4.6.5.3 Visual Glide Slope Indicators

Visual descent information is provided to pilots at MLB using 4-light unit Precision Approach Path Indicator (PAPI) systems on each of the four parallel runway ends and 2-light unit PAPI systems on the Runway 5/23 ends. All six of these systems are located on the left side of the runway they serve. The four PAPI systems for the parallel runway ends require frequent maintenance due to their condition and need to be replaced. New PAPI systems should be coordinated with the need to relocate some of the 4-light units with the ultimate length and/or thresholds of the parallel runways. The 2-light units on Runway 5/23 are in good condition but will likely require replacement before the end of 20-year planning period.

4.6.5.4 Wind Indicators

The primary windsock is internally illuminated and part of the airport's segmented circle. Located to the northwest of the Runway 5/23 midpoint, its size and location also serves to provide an indication of the wind to aircraft landing on Runway 27L. Three supplemental windsocks have been installed for the other runway ends. These are all in the preferred location, which is within 1,000 feet of the landing threshold for the runway they serve. All three of these supplemental windsocks are lit and only the one for Runway 9R is not located on the left side of the runway. As with other takeoff and landing aids, the supplemental windsocks will need to be relocated based on the ultimate threshold locations of the parallel runways.

4.7 Heliports

While rotorcraft can operate at most airports without impacting aircraft operations, dedicated facilities should be considered before the volume of rotorcraft activity does create an impact. The aviation activity forecasts showed both an increase in the number of based rotorcraft and their operations over the course of the planning period. Therefore, at least one heliport should be planned to provide a dedicated space for these operations.

Requirements for heliports are based on the criteria contained in FAA AC 150/5390-2C, *Heliport Design*. For planning purposes, the Eurocopter AS350 was selected as the design rotorcraft since it has similar characteristic to other popular rotorcraft. This includes the McDonnell Douglas MD500 and Bell 206 JetRangers; however, the AS350 is slightly more demanding with respect to rotor diameter and overall length. It is also representative of the larger Eurocopter EC135 and Bell 429 GlobalRanger rotorcraft based at the airport. Planning a heliport to the requirements of this midsize group of rotorcraft will also provide more than adequate space for a number of the smaller,

piston rotorcraft which are very popular for training. These include the Schweitzer 300s and Robinson rotorcraft (R22 and R44 models).

4.7.1 Safety Criteria and Surface Characteristics

The Eurocopter AS350 requires the following areas for a GA heliport:

Touchdown and Lift-off Area (TLOF) = 36 feet (1 times the rotor diameter of the critical rotorcraft). The AS350 has a rotor diameter of 35.1 feet. The entire TLOF should be load bearing for the design helicopter. PCC is recommended for ground level facilities. Asphalt surfaces are less desirable as they may rut under the skids or wheels of a parked helicopter.

Final Approach and Takeoff Area (FATO) = 64 feet (1.5 times the overall length of the critical rotorcraft). The AS350 has an overall length of 42.5 feet. The area between the TLOF and FATO should be capable of supporting the static loads of the design helicopter. If the FATO is load bearing, the portion abutting the TLOF should be continuous with the TLOF and the adjoining edges should be at the same elevation. If it is unpaved, the FATO should be prepared to prevent loose stones and any other flying debris caused by rotorwash.

Safety Area = 20 feet beyond the FATO. The Safety Area needs to be clear of all objects except any frangible objects that must be located within due to their function. The Safety Area does not need to be load bearing and in fact, can extend over water (such as a drainage area). If the Safety Area is load bearing, the portion abutting the FATO should be continuous with the FATO and the adjoining edges at the same elevation. If unpaved, the Safety Area should be prepared to prevent loose stones and any other flying debris caused by rotorwash.

4.7.2 Separation Requirements

To avoid limiting other airfield operations, the heliport Safety Area cannot overlap any surface which protects the movement of aircraft in other areas (such as a Taxiway Object Free Area). FAA AC 150/5390-2C states the TLOF and FATO areas are closed to other aircraft if a helicopter or other mobile objects (dollies, tug, automobile, etc.) are within the FATO or Safety Area.

4.7.3 VFR Approach/Departure Surfaces

At least one VFR Approach/Departure Surface must be established to the heliport. The surface starts at the edge of the FATO and slopes out and upward at an 8:1 ratio for a distance of 4,000 feet horizontal. At the outer limit, the surface is at a height of 500 feet above the established elevation of the TLOF and has a width of 500 feet.

Transitional surfaces also extend out from the edges of the FATO for a distance of 250 feet to each side of the FATO from the approach/departure surface centerline. The side transitional surfaces slope out and upward at a 2:1 ratio and are not applied to the FATO edge opposite of the approach/departure path.

Curved VFR approach/departure paths are also allowed. FAA AC 150/5390-2C provides the criteria necessary to construct such corridors.

4.7.4 Protection Zone

There is also a protection zone which starts at the FATO and extends out 280 feet beneath the 8:1 approach/departure surface. The size and shape of the protection zone matches the 8:1 approach/departure surface and has no set elevation. Potential sites to establish a public use heliport will be evaluated in the airport alternatives using the criteria above.

4.7.5 Identification Marking and Lighting

The public heliport should have the standard white "H" marking in the center of the TLOF, oriented in the direction of the preferred approach/departure path. The height of the "H" should be at least 12.75 feet (0.3 times the overall length of the critical rotorcraft, which is 42.5 feet for the AS350). For night operations the perimeter of the TLOF area should also include flush, omnidirectional green lights. In addition to the four corners, each side should include an additional light located in between the corner fixtures. The lights need to be located within one foot inside or outside the TLOF perimeter.

4.8 Passenger Terminal Building

Concurrent with the preparation of this Master Plan update, the MAA commissioned a separate study to renovate the existing passenger terminal building and plan for future growth and building needs through 2035. This study, referred to as the Terminal Transformation Master Plan (TTMP), evaluated the terminal building and developed a 20-year master plan that would improve and modernize the terminal building – not only to improve the building's efficiency, but reflect MLB's unique role and setting.[5] Preparing the TTMP as a separate study allowed the MAA to: 1) obtain a detailed assessment of the structure and its systems; 2) identify needed repairs and upgrades; 3) identify space allocation needs and functional improvements; and 4) explore more deeply building renovation and design concepts than typically conducted for an Airport Master Plan update. A copy of the TTMP Conceptual Design Plan is provided in **Appendix B** of this Master Plan update.

The concurrent preparation of the TTMP and this Master Plan update were coordinated for the purpose of sharing information and ideas and minimizing duplication of effort. As such, the TTMP, prepared by BRPH Architects-Engineers, Inc., is the "master plan" for the terminal and will not be replicated in this document. However, the TTMP provides a substantial source of relevant information that should be incorporated into this Master Plan update. The following discussion will summarize the key findings and recommendations of the TTMP for passenger terminal building improvements necessary to meet current and projected passenger activity demands in light of space allocation, efficiency, and customer experience. Except where notable conditions may exist, repairs/upgrades to existing building systems (e.g., mechanical and plumbing systems) will not be discussed in detail. As needed, additional information was developed by ESA to address or further evaluate specific issues.

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5 *Melbourne International Airport Terminal Transformation – Building Assessments*. BRPH Architects-Engineers, Inc. May 2015 (Workshop Issue). *Melbourne International Airport Terminal Transformation – Conceptual Design Plan*. BRPH Architects-Engineers, Inc. May 2015 (Workshop Issue).

4.8.1 Passenger Terminal Planning Approach

The TTMP used a “demand driven” approach to evaluate existing and future passenger terminal facility requirements at MLB. This approach established baseline conditions and utilized the aviation forecast developed for this Master Plan update to identify airside and landside facility needs necessary to accommodate existing and projected passenger volumes and the size and type of commercial aircraft transporting the passengers.

4.8.1.1 Historic Demand

Passenger enplanements at MLB increased steadily throughout the 1980s, coinciding with the population growth in Brevard County during the same period. The highest number of enplanements at MLB occurred in 1990, with 378,341 enplanements. Between 1990 and 1995, MLB averaged more than 330,000 annual passenger enplanements. To meet the demand, the MAA constructed a new passenger terminal building in 1991. The existing passenger terminal building represents a facility that was built to accommodate the historic demand of the early 1990’s.

4.8.1.2 Current Demand

The TTMP found that the capacity of the passenger terminal building generally exceeds existing condition passenger enplanement demands (224,260 enplanements in 2014). The terminal building has sufficient capacity to accommodate passenger growth throughout the early phases of the TTMP.

4.8.1.3 Future Demand

The TTMP was prepared using the recommended passenger enplanement forecast growth rate (5.5 percent annual growth through the year 2035) that was recommended in Chapter 3 of this Master Plan update. Similarly, the TTMP anticipated the introduction of international passenger carriers to the airport. This international service would use larger commercial aircraft that carry more passengers per flight than the domestic narrow-body aircraft that presently serve MLB. The TTMP found that international service would increase the number of passengers beyond the current capacity of the building.

4.8.2 Passenger Terminal Facility Demand

4.8.2.1 Peak Hour Volumes

The TTMP evaluated peak hour volumes for the terminal in both departure and arrival flows from projected historic traffic counts. For 2015, the TTMP established 226,594 enplanements and 221,819 deplanements (448,413 total passengers) for the baseline program requirements. This number of total passengers is essentially the same as the 2014 baseline calculated for MLB in Table 3-28 of this Master Plan update. Anticipated modal peak hour volumes in the TTMP were calculated from these 2015 projected annual passenger volumes over a twenty year planning horizon. While some seasonal variation exists, as documented in the aviation forecast, it was not considered significant and therefore no seasonal adjustment was applied in the TTMP to the peak hour volume.

4.8.2.2 Peak Hour Aircraft Fleet Mix Demand

The TTMP evaluated aircraft fleet mix to generate the peak hour demand for aircraft gates at MLB. Consistent with the aviation forecast prepared for this Master Plan update, the TTMP projected that domestic narrow-body aircraft would continue to represent the terminal building's origination and destination (O&D) characteristics, as well as MLB's current Small-Hub classification in the FAA's NPIAS. A baseline of 150 passengers per aircraft and a domestic airline signatory lease model was used to generate gate demand over the TTMP's planning horizon. Peak hour gate turn intervals were then estimated at a maximum of 45 minutes per turn, on average. An average aircraft load factor of 80 percent was used to evaluate gate demand and space needs. While the TTMP terminal planning assumptions were slightly different from the specific fleet utilization projections presented in the aviation forecast prepared for this Master Plan update, both generated similar results and values.

4.8.2.3 Peak Twenty Minute Demand

The planning approach used in the TTMP adjusted the peak hour departure and arrival volumes based on a peak 20-minute demand. Under this premise, 50 percent of the hourly traffic volume would be accommodated in all areas of the terminal. Each area was then tested for its ability to accommodate this projected capacity. The intent of this peak 20-minute approach is to ensure that each component of the system has sufficient capacity to accommodate additional traffic during peak areas of growth.

4.8.3 Terminal Transformation Master Plan Summary

4.8.3.1 TTMP 2015 Domestic Program (Phase 1)

Overall, the TTMP determined that the size and layout of the existing passenger terminal building was sufficient to accommodate the current level of passenger activity. However, the TTMP identified improvements necessary to modernize the passenger terminal building and provide a base for future facility expansion.[6] A summary of the 2015 Domestic Program's proposed improvements, also referred to in the TTMP as Phase 1, includes:

Building Exterior

Replace sliding glass doors	Roof replacement / repair
Replace roof skylight	Lower high-mast pole lighting
Update/modify exterior walls	Curbside lighting upgrades
Upgrade main terminal entrance signage	

Ticketing

Install new tile and carpet	New / refreshed finishes
Resurface ticketing counters	New ceiling
New furniture	New signage
Associated structural, mechanical, fire protection, electrical, plumbing upgrades	

6 *Melbourne International Airport Terminal Transformation – Project Phasing Memorandum.* BRPH Architects-Engineers, Inc. July 1, 2015.

Atrium

Install new tile and carpet
New wood accent ceiling
Relocate TSA and TSA data room
New entrance from Domestic Terminal
New lobby furniture
New interior signage / monitors
New Florida experience display
New retail area
New / refreshed finishes and accents
Upgrade restaurant counters and seating
New restaurant ceiling and lighting
Renovate restrooms near ticketing
New observation tower / elevator
Associated structural, mechanical, fire protection, electrical, plumbing upgrades

Domestic Terminal

Install new tile and carpet
Renovate restrooms
Resurface gate counters
Coffee shop and retail space renovation
New kiosks
Associated structural, mechanical, fire protection, electrical, plumbing upgrades
New / refreshed finishes and accents
Center concourse ceiling upgrade
New signage
New furniture (to supplement existing)
New concourse bar

Baggage Claim

Install new tile and carpet
New paging system
Associated structural, mechanical, fire protection, electrical upgrades
New / refreshed finishes
New lighting
New signage and monitors

BRPH

SOURCE: MLB Terminal Transformation Master Plan - Conceptual Design Plan, BRPH Architects-Engineers, Inc. May 2015.

4.8.3.2 TTMP 2016 International Program (Phase 1.5)

As noted previously, the MAA is aggressively marketing MLB to international carriers. The TTMP 2016 International Program (Phase 1.5) anticipated the introduction of international passenger carrier service to the airport in 2016. This international service would bring larger commercial aircraft to MLB, carrying more passengers per flight than the domestic narrow-body aircraft that presently serve MLB. As discussed in Chapter 3 of this Master Plan update, international service would substantially increase the number of passengers at MLB.

The two-level International Terminal, located on the west end of the terminal building, has one international gate on the second level that is equipped with a boarding bridge capable of servicing wide-body jets. The 44,000 square foot terminal has security screening, concessions, departure lounges, and a Federal Inspection Services (FIS) located on the second floor. The TTMP evaluated the introduction of international passenger carrier service and recommended that the International Terminal and a portion of the second floor of the terminal building presently used for support and administrative functions be improved to provide a second wide-body international gate and expanded space for departure lounges/holdrooms, concessions, and restrooms. A secure corridor would be constructed on the north side of the passenger terminal building that would allow cleared passengers to move between the international and domestic gates. Presently, to move between the international and domestic terminals, passengers must leave the secure areas, walk through the non-secure terminal building, and pass through security. Under Phase 1.5, additional space may be needed for baggage claim, ticketing, security checkpoint, rental car, ground transportation, and curbside functions.

The FIS facility can process approximately 500 passengers per hour in its current configuration (based on processing two concurrent international flights). The FIS facilities were considered to be adequate for future (long-term) demand.

4.8.3.3 TTMP 2028 Domestic/International Program (Phase 2)

The TTMP 2028 Domestic/International Program (Phase 2) evaluated passenger demand and terminal building needs in 2028. This mid-term scenario anticipates the need for three additional gates that would provide a total of eight domestic gates and two international gates – near double the number of existing gates. The conceptual plan would expand the terminal building to provide additional concourse and holdroom space along the northwestern area of the terminal building. The TTMP recommends that a two-level expansion of the terminal be implemented in Phase 2. Level one will serve to accommodate additional airside operations and airport support facilities

At the 2028 projected level of domestic and international passenger activity, the TTMP recommended the development of an “airside hub” that would accommodate additional food, beverage, and retail concessions. The program also identified the need for one additional baggage claim unit, additional security checkpoint stations, and curbside area improvements.

4.8.3.4 TTMP 2035 Program (Phase 3)

The TTMP 2035 Program (Phase 3) provides a long-term conceptual plan to accommodate the projected growth in passenger enplanements at MLB. In this time frame, the conceptual plan anticipates the need for 14 gates (12 narrow-body domestic gates and two wide-body international gates). Additionally, there was an Option to the 2035 Phase 3 where an additional wide-body aircraft gate and the associated terminal space was envisioned to accommodate additional international passenger growth. BRPH reports that the current terminal building can accommodate the 2035 program in certain functional areas; however, some areas and facilities would require expansion. Areas that may need additional space include the Domestic Terminal, International Terminal, rental car, baggage claim, and concessions. The TTMP expects the terminal would need to nearly double in size to meet the overall future demand.

4.8.3.5 TTMP Functional Area Demand

Functional areas were evaluated in the TTMP based on a balanced facility approach. Each functional area was analyzed by BRPH based on the peak 20-minute demand to ensure that the functional components would meet the gate demand. The peak 20-minute passenger factors were 1,091 passengers in the departure flow and 1,068 passengers in arrival flow. The anticipated demand for each major functional area, summarized by BRPH, is provided below. The analysis of facility requirements in the TTMP were presented as a general assessment of what capacity enhancements would be needed in the future, compared to existing conditions.

Ticketing

There are currently 46 agent ticket counter positions at MLB. Based on projected enplanements, the total number of agents at a traditional counter would be 56 by 2035. However, the demand for traditional counter check-in is expected to continue to decrease over time. For future planning, the TTMP assumed that 60 percent of the passengers would check in electronically, remotely, or at curbside. The TTMP recommended up to 14 agent positions at the departure curbside by 2035 and a total of 37 check-in kiosks by 2035.

Passenger and Baggage Screening

The peak 20-minute demand at the Transportation Security Administration (TSA) security screening checkpoint was projected to be 1,100 passengers by 2035. The total peak 20-minute demand, when including employees, would be 1,200 people. By 2035, the security screening checkpoint was projected in the TTMP to require five magnetometer stations and one “green lane” to accommodate this traffic.

Based on interviews conducted for this Master Plan update and visual observations of the security screening checkpoint, the following improvements should be considered during the development of terminal renovation and modernization design plans:

- There are presently two passenger screening lanes in the Domestic Terminal. TSA operates one lane as an Express Check (“modified pre-check”). TSA stated that, at certain times, up to 50 percent of passengers passing through the screening checkpoint are pre-checked. During the 5:30 a.m. and 7 a.m. morning peaks, the average time for a passenger to pass through

screening is approximately 8 minutes. TSA indicated the near-term need for an additional (third) lane that could be operated separately for pre-checked passengers.

- TSA desired a "more open" layout at the security screening checkpoint, including space for a raised podium.
- TSA indicated that improvements to the baggage handling system (updated belt conveyor system and possible carousel) would enhance the efficiency of screening outbound baggage.

Airside Concourse

The TTMP projected the need for a total of 14 departure gates by 2035, 12 of which would be utilized by domestic narrow-body aircraft. The space required for each domestic gate was programmed at 2,300 square feet (27,600 square feet total). Two gates would accommodate international wide-body aircraft. The space required for each international gate was programmed at 4,500 square feet (9,000 square feet total). Airside airline ticket office space and general public circulation space in the concourse was programmed to be 6,420 square feet and 18,300 square feet, respectively.

The current airside concourse is 26,491 square feet in size. The airside concourse space needed by 2035 is 43,270 square feet, which requires construction of an additional 16,529 square feet of space to meet the expected demand.

Concessions

The total space anticipated for concessions is 28,080 square feet for on the non-secure side and 36,000 square feet on the secure side of the terminal. This space was projected from current revenues over the planning period and escalated in parallel with the projected growth in enplanements at MLB. The TTMP integrates public seating areas and restaurant seating into an open café-like setting for both the non-secure and secure spaces. It is anticipated that international passengers will increase the demand for additional food and beverage service, traditional retail space, and duty free space.

Baggage Claim

There are currently two domestic belts in the baggage claim areas and one international baggage claim belt in the FIS facility. The TTMP anticipates the need for one additional belt by 2035. The Phase 3 development plan proposes that the new belt be installed in the existing domestic baggage claim area.

Rental Car and Ground Transportation Counters

The TTMP anticipates a total of 75 linear feet of rental car counter (accommodating 15 agents) will be needed to accommodate future rental car counter needs at the airport. This would require 40 linear feet of queue and approximately 3,000 square feet of circulation space. An additional 600 square feet of office and support space was also recommended. The TTMP 2035 Program recommends the relocation of rental car counters to the south area of the terminal and/or adjacent to the future rental car ready areas. The total program for the recommended rental car and ground transportation operations is 3,600 square feet.

Terminal Curbside

The TTMP anticipated a curbside and ground transportation demand of 1,068 passengers during the peak 20-minute period. Modal splits, derived from site observations and discussions with MAA staff, estimated 40 percent of passengers using the terminal curbside; 40 percent of passengers using the vehicle parking lot, 10 percent using rental cars and, and 10 percent using taxi service. The required curb length at the terminal was estimated to be 1,479 linear feet. The total length of the arrivals curb would be 990 feet over a two lane configuration. The curb was proposed to be a new, linear configuration adjacent to the Domestic Terminal and International Terminal arrival areas. This configuration anticipates a 67 percent utilization of the first lane and the second lane to remain for excess capacity.

The TTMP estimated that 220 linear feet of taxi parking would be required. The existing taxi que line was determined to be adequate to accommodate future demand. Configuration of the required curbside areas will be evaluated with the terminal access road (Air Terminal Parkway) and automobile parking options in the airport development alternatives chapter.

Airport Administration Space

The TTMP also identified the need to utilize the existing airport administration space to accommodate the expansion of the international terminal facilities for Phase 1.5. Therefore, options to replace the approximate 36,800 square feet of space currently utilized by airport staff in the passenger terminal building need to evaluated as part of the development alternatives.

4.8.4 Passenger Terminal Apron

The apron area around the passenger terminal was evaluated as part of the latest pavement inspections conducted by FDOT in March 2015. As with the runway and taxiway pavements, many of the 2015 PCI ratings differ from those from the 2012 inspection which were documented in the existing conditions chapter of this Master Plan update. The 40,000 square yards of PCC apron surrounding the terminal for aircraft parking has PCIs ranging from 74 (Satisfactory) to 91 (Good). The lowest ratings were adjacent to the west side of the terminal building, around the single international gate. Surrounding all of the concrete aircraft parking apron, there is an additional 45,000 square yards of asphalt concrete for the apron edge taxilanes and aircraft maneuvering space. These areas have PCIs which range from 82 (Satisfactory) to 92 (Good).

While FDOT has not made any recommendation for the rehabilitation of these terminal apron areas, some will need to be rehabilitated before the end of the 20-year planning period. At a minimum, the PCC portions that support aircraft parked at the different terminal gates will have to be expanded with the additional domestic and international gate positions identified in the TTMP.

4.9 Landside Facilities

An integral part of the airport's operation includes the landside facilities that provide ground access and automobile parking.

4.9.1 Road Access

Direct and convenient roadways to passenger terminal facilities are the most important element of the ground access to a commercial service airport. For MLB, the current network of roads around the airport to the terminal facility has been a limiting factor to the passenger growth. This is equally true for the expanding workforce that commutes daily from all over the Brevard County and Indian River County area to the companies located on-airport property.

As detailed in previous chapters, a more direct access to MLB will be created by the end of this study's short-term planning period once Ellis Road is expanded and a new interchange with Interstate 95 (I-95) is complete. Not only will this project provide direct and convenient access to the airport, it will also relieve congestion on both State Road 192 (New Haven Avenue) and State Road 518 (Eau Gallie Boulevard).

For the facilities on the north side of the airport, access is provided by General Aviation Drive off Apollo Boulevard. However, with the expansion of facilities on this side of the airfield, a second access road has been designed and constructed in 2016. This new two lane road connects St. Michael Place (the road just south of the Melbourne Police Headquarters) to the west half of General Aviation Drive. In addition to providing the secondary access needed on the north side of the airport, this new road will enable additional landside access improvements to be made for future aviation and non-aviation uses.

On the east side of the airport, any expansion of facilities in the Northeast Apron area will have direct access off of Apollo Boulevard. However, the possibility of creating a new opening in the Apollo Boulevard median at some point adjacent to the Northeast Apron area needs to be considered. Currently no such median cut exists south of General Aviation Drive. As a result, every user of the current and future facilities on this side of the airport can only turn right onto Apollo Boulevard.

4.9.2 Automobile Parking

As part of this Master Plan update, the existing and projected demand for parking at the passenger terminal building was analyzed. The analysis, prepared by Kimley-Horn and Associates, also identified facility improvements necessary to meet the projected demand.[7] The public parking, rental car parking, and rental car support facilities requirements from that study have been summarized in the following sections. Additional information was developed by ESA to address other airport parking needs.

4.9.2.1 Public Parking

The existing public portion of the terminal parking lot contains 875 spaces in one surface lot. In 2015, MAA contracted with a private company to manage the parking lot, which includes upgrading the access gates and ticketing equipment. As part of that contract, the private operator

7 *MLB Rental and Public Parking Supply Demand Analysis, Orlando Melbourne International Airport*. Kimley-Horn and Associates, March 2016.

will also establish separate areas for short-term and long-term parking. The demand for short-term parking is typically 15 percent of long-term parking demand.

Public Parking Demand

For planning purposes, a parking facility is effectively full when occupancy reaches 95 percent. Therefore, the effective public parking supply at MLB is 831 stalls. Based on a review of parking lot transaction data, the parking study identified the peak midday occupancy at MLB. In 2015, this occurred in late March (Spring Break) with 681 out of 875 spaces occupied (78 percent of effective capacity). Based on a peak occupancy design day (681 spaces filled) and the number of annual passenger enplanements, a parking demand ratio of 3.04 spaces per 1,000 annual enplanements was calculated for MLB (see **Table 4-17**).

TABLE 4-17
PUBLIC PARKING DEMAND RATIO

Enplanements	224,260
Occupancy Design Day	681
Parking Demand Ratio (Design Day) per 1,000 Annual Enplanements	3.04

SOURCE: Kimley-Horn and Associates, 2016.

Public Parking Requirements

The parking study applied the demand ratio to the number of forecasted enplanements to determine future parking demand. As **Figure 4-7** illustrates, the parking demand is expected to exceed the supply of available public parking spaces in 2020. Therefore, assuming up to three years from initial approval to complete any significant parking improvements, it is recommended that the MAA begin the planning for additional public parking in late 2016 or early 2017. Furthermore, if the marketing efforts to secure international travel are successful and enplanements increase faster than forecasted, the need for additional parking would be accelerated. The additional automobile parking options, along with the associated access lanes, circulation to/from NASA Boulevard, and adjacent facilities will be evaluated as part of the airport development alternatives.

Figure 4-7: Projected Public Parking Supply and Demand

Source: Kimley-Horn and Associates, 2016.

4.9.2.2 Rental Car Parking and Support Facilities

Currently there are six agencies represented at MLB, including Enterprise, Alamo, National, Hertz, Avis, and Budget. The service these companies provide require three components: 1) customer counter in the terminal building, 2) ready and return car parking,[8] and 3) vehicle service and storage facilities.[9] Facility requirements for the components described above are based on peak transaction activity.

Rental Car Transactions

Data provided by MAA showed there were 57,055 transactions in 2015 with March as the peak month, primarily due to Spring Break. Therefore, this sizing analysis uses a busy day in the peak month of March as the design criteria. The average length of a rental at MLB in 2015 was 3.75 days. Rental car transactions at MLB were evaluated during the busiest week in March. The data shows that MLB follows a typical airport rental car activity pattern where more cars are rented early in the week and returned later in the week. During this week, there were 1,543 car rentals and 1,508 returns. Monday was the busiest day during the week with 181 rentals and 112 returns. Peak rentals on the busiest day (Monday) occurred at 5 p.m. The next busiest time for rentals on that day was 10 a.m. The sizing of the ready and return area is based on multiples of rentals and returns during the peak hour.

8 The ready and return car parking lot is where ready-to-rent vehicles are picked up and returned rental vehicles are dropped off. There are currently 190 spaces in the MLB ready and return parking lot. Kimley-Horn and Associates, March 2016.

9 Returned rental cars are serviced and cleaned at facilities located along NASA Boulevard. The service facilities include fuel pumps, car washes, maintenance bays, and administrative space. Cars are also stored here until moved to the ready and return lot. Kimley-Horn and Associates, March 2016.

Future Rental Car Service and Storage Facilities

The rental car agencies at MLB presently share the ready and return lot. Each agency has its own storage and service facility. These facilities, located on NASA Boulevard at the main entrance to the passenger terminal, are more than 25 years old and outdated in terms of equipment and operational needs of the rental car agencies. In addition, the facilities occupy seven acres of airport property having prime road frontage with the potential for a higher and better use in terms of generating airport revenue and/or providing amenities to airport users and the public (e.g., hotels, shops, restaurants).

The need for and development of a new rental car service facility at another location on-airport property has been discussed for several years and is recommended in this Master Plan update. Although alternatives will be discussed in the next chapter, it is anticipated that a new rental car service facility would have shared fueling and car wash bays, but would continue to have secure, exclusive use storage and maintenance bays.

Future Rental Car Demand

Based on the recommended forecast, which consider the potential for international charter service, the peak hour car rental and return levels at MLB would grow at approximately 11 percent. It should be noted that the international charter service would primarily increase the demand for rental cars at MLB with little impact expected to public parking demand. **Table 4-18** shows the peak hour transactions based on the recommended forecast. **Table 4-19** shows the peak hour transactions if the High-Growth scenario is achieved (substantially increased international charter flights).

TABLE 4-18
FUTURE RENTAL CAR DEMAND

	2013	2020	2025	2035
Passenger Enplanements	224,260	309,600	405,000	693,100
Rental Car Transactions	54,973	75,892	99,278	169,900
Rental Car Transaction Days	206,843	285,555	373,546	639,271
Design Day (Peak Hour)				
Rentals	33	46	60	102
Returns	22	30	40	68

SOURCE: Kimley-Horn and Associates, 2016.

TABLE 4-19
FUTURE RENTAL CAR DEMAND (HIGH-GROWTH SCENARIO)

	2013	2020	2025	2035
Passenger Enplanements	224,260	342,072	462,111	777,232
Rental Car Transactions	54,973	83,852	113,277	190,523
Rental Car Transaction Days	206,843	315,504	426,219	716,867
Design Day (Peak Hour)				
Rentals	33	50	68	114
Returns	22	34	45	76

SOURCE: Kimley-Horn and Associates, 2016.

Rental Car Facility Requirements

The existing 190 space rental car parking area would need additional space when passenger activity at MLB approaches 400,000 enplanements (PAL-2). The potential for MLB to substantially increase international charter service under the High-Growth scenario indicates a greater near-term need for additional ready and return spaces. **Tables 4-20** and **4-21** show the demand for ready and return spaces and separate rental car storage space for the recommended forecast and the High-Growth scenario.

TABLE 4-20
FUTURE RENTAL CAR FACILITY REQUIREMENTS

	Existing	2020	2025	2035
Shared Use				
Ready/ Return [1]	190	144	189	323
Car Wash	NA	2	2	2
Fueling Dispensers	NA	4	6	6
Exclusive Use				
Storage [2,3]	540	577	755	1,292
Maintenance Bays	3	3	3	3
Car Wash	3	NA	NA	NA
Fueling Dispensers	5	NA	NA	NA
Administrative Area	1,200	1,200	1,200	1,200

[1] Two and a half times peak hour rentals plus one hour of returns.
[2] Four times ready return demand.
[3] Existing storage approximately 500 to 550.

SOURCE: Kimley-Horn and Associates, 2016.

TABLE 4-21
FUTURE RENTAL CAR FACILITY REQUIREMENTS (HIGH-GROWTH SCENARIO)

	Existing	2020	2025	2035
Shared Use				
Ready/ Return [1]	190	159	215	362
Car Wash	NA	2	2	2
Fueling Dispensers	NA	4	6	6
Exclusive Use				
Storage [2,3]	540	638	861	1,449
Maintenance Bays	3	3	3	3
Car Wash	3	NA	NA	NA
Fueling Dispensers	5	NA	NA	NA
Administrative Area	1,200	1,200	1,200	1,200

1 Two and a half times peak hour rentals plus one hour of returns.
2 Four times ready return demand.
3 Existing storage approximately 500 to 550.

SOURCE: Kimley-Horn and Associates, 2016.

4.9.2.3 Other Parking Areas

Other parking areas include the terminal area employee parking, cell phone waiting lot, and general airport facility parking considerations.

Terminal Area Employee Parking

The primary passenger terminal area employee parking and cell phone waiting lots are located adjacent to the public parking areas described above. There have been no problems reported related to the current number (149) of employee parking spaces. For planning purposes, future employee parking at the terminal should increase approximately 33 percent for a total of 200 spaces. This would accommodate the additional terminal area employees expected for passenger growth, including increases of US Customs and Border Protection staff as well as those for the Federal Inspection Services required for any international charter activity. An expansion to this area will be considered as part of the future terminal parking area improvements.

Cell Phone Waiting Lot

The 12 spaces of the dedicated cell phone waiting lot appear to provide adequate space for the current flight schedules. However, an expansion of this area will be considered as part of the future airport parking area improvements. It is anticipated that at a minimum of 35 spaces would be required by PAL-3. This number corresponds with the recommend passenger enplanement growth over the planning period.

General Airport Facility Parking Considerations

Outside of the passenger terminal area, other employee and public parking considerations will depend on the types of facilities they serve. As such, each will be evaluated as part of the individual development alternatives. For example, additional parking facilities (primarily employee) will need to be included as part of the future development around the current air cargo building and MRO facility. Likewise, parking is a significant consideration for the improvement and development of general aviation hangars. This is particularly true for the smaller hangar and T-hangar areas where automobiles are typically either parked in the hangar or left on the aircraft parking apron while the aircraft is in use. For any future facilities an adequate amount of landside space needs to be included for automobile parking.

4.10 Air Cargo Facilities

This section addresses air cargo facility requirements at MLB. The evaluation considers past and present air cargo activity at the airport, as well as future needs based on discussions with airport users, airport management, and the aviation forecast developed for this Master Plan update. The evaluation applies industry-accepted planning standards for passenger airline (belly-haul) and all-cargo carrier demand operations.

4.10.1 Passenger Airline Cargo Facilities

Consistent with national trends, the aviation activity forecast developed projects very modest growth in passenger airline (belly-haul) cargo volumes (both the enplaned and deplaned cargo) at MLB. Over the past two decades, all-cargo carriers have taken a greater share of the domestic cargo activity. This decrease in passenger airline cargo volumes results from several factors, including security restrictions, use of alternative modes of transportation, the U.S. Postal Service's increased use of all-cargo carriers, substitutes to traditional mail (e.g. e-mail), increased use of overnight delivery services, and changes in airline operating models. These trends are expected to continue nationally and at MLB.

Historic passenger airline cargo volumes at MLB have only averaged around 50 pounds per airline operation, which is roughly the equivalent of one or two suitcases on each flight. Because passenger airline cargo activity and volumes are not expected to increase significantly over the planning period, the need for additional airline space or dedicated airline cargo facilities are not required. Space in the passenger terminal building necessary for processing and handling airline cargo in the existing airline ticket counters, baggage make-up areas, and baggage claim areas is sufficient to meet present and future needs.

4.10.2 All-Cargo Carrier Facilities

While there are currently no all-cargo carriers operating at MLB, there is considerable potential for all-cargo carriers and dedicated air freight to establish operations at MLB. This potential is based on:

- MLB is strategically located on the Space Coast and is a center for aerospace, aviation, and defense industries. The airport is also home to several major aircraft manufacturing, assembly, and repair facilities. These companies presently generate a demand for air cargo shipments and deliveries and require access to a reliable "just in time" supply chain network. As MLB's tenants and area businesses continue to expand their facilities and operations, the demand for air cargo services is expected to increase.
- An extremely important factor that will affect the demand for air cargo facilities MLB is the upcoming new interchange at I-95 and Ellis Road and associated local roadway improvements. This project will provide the *direct connection* to a major highway that is *required* for establishing multimodal cargo operations at MLB. Several elements of the new access road are in place and construction of the interchange is scheduled to begin in the next few years.

While it is difficult to predict the size and type of aircraft that would be utilized for regularly scheduled service, the largest dedicated freighters have been considered for planning purposes. These include the Boeing 757-200PF and Boeing 747-400F aircraft included as part of the runway length analysis in this chapter. It is practical to plan for the larger aircraft given that the expanding activities at the airport include aircraft assembly, heavy aircraft maintenance, and military equipment contractors, all of which can require large cargo payloads.

Landside facilities needed to support all-cargo carrier activity are currently available at MLB. This includes a 123,000 square foot cargo building that is located within a Free Trade Zone. This facility has a full-length truck court, office space, and access to 4-lane Apollo Boulevard. There is an existing 7,400 square yard apron located near the west corner of the building (along the east edge of Taxiway U). While the 2015 FDOT pavement evaluation documented this apron with a PCI of 88 (Good), the pavement can no longer be utilized for aircraft parking due to the fact that Taxiway U now supports ADG V aircraft taxiing to/from the MRO facility on the East Apron (the upgraded taxiway object free area encompasses the air cargo apron).

As the demand for regularly scheduled air cargo operations presents itself, a new apron capable of accommodating two large all-cargo aircraft is recommended. Taking the physical dimensions of the Boeing 747-400F and space required for wingtip clearance, ground support equipment, and staging of cargo; approximately 7,000 square yards would be required for each aircraft parking position. Therefore, the ability to provide approximately 14,000 square yards of apron next to the air cargo facility will be evaluated in the airport development alternatives.

4.11 General Aviation Facilities

The following sections address various airport facilities required to support existing and projected GA activity, which made up over 95 percent of the annual operations at MLB in 2014. The three full-service FBOs – Atlantic Jet Center, Baer Air, and FIT Aviation – have developed terminal facilities, hangars, and aircraft parking aprons on land leased from the MAA. These FBOs serve their based and itinerant customers. As GA activity and demand for services increase over time, areas available to support additional GA facility development need to be identified on MLB's future development plans.

This Master Plan update included group meetings and one-on-one interviews with several GA users and tenants, information workshops, and the use of GA user and tenant survey forms. The purpose of the outreach program was to solicit input from the GA community at MLB as to their overall experience at the airport and desired improvements. For the most part, GA users were pleased with the airport and its management; however, some expressed concern that more interest should be paid to GA users and GA facilities (e.g., maintenance of taxiways around hangars). Improvements desired by GA users (that attended meetings or responded to survey questionnaires) are listed below.

Improvements Desired by MLB GA Tenants and Users

Taxiway and apron pavement maintenance	New hangars on south side of airfield
Self-service fuel (Avgas)	Improve south side T-hangars
Full-time Customs services	Restaurant / concessions for GA users
On-site avionics repair	Access to Wi-Fi in hangar areas
GA vehicle access and parking	Additional regular and large T-hangars
Update/improve secure gate access	Additional box hangars
Taxiways connecting parallel runway ends	Improve pedestrian access to terminal
Exterior lighting at south side T-hangars	Ground transportation options for GA
Additional tie-downs	

Many of these desires are addressed in this section as well as others in this chapter such as aviation fuel supply and service. The existing public-use GA hangar and aircraft parking apron areas were evaluated with the expected demand to identify future needs. Beyond meeting minimum standards, no assessment was made with respect to existing or projected FBO building space requirements because the size and types of space, as well as amenities would be determined by each FBO. Responses to the existing and projected increase in GA activity, and a demand for additional GA facilities and services, would be a business decision made by each FBO and other tenants at MLB that provide commercial aeronautical services (e.g., maintenance, avionics). However, the need for additional hangar and apron space will be evaluated to further support the growth of GA activity at the airport. While the airport owns and directly leases some T-hangars units, the MAA's primary role is to manage and develop the airport in a safe and efficient manner for all of the different aviation users. Therefore, the following sections help identify future GA needs to be evaluated and balanced with the other facility demands and development needs.

4.11.1 Aircraft Hangar Requirements

Because hangars provide protection from weather and a level of security for the aircraft, they are one of the most desirable means for aircraft storage at any airport, when offered at a reasonable rate. Most hangar space at an airport is used for the long-term storage of based aircraft. A small percentage of space is used by itinerant aircraft, usually for maintenance or occasional visits. The hangars available to the public at MLB include T-hangars, box hangars, and executive hangars. There are also a number of large clearspan hangars used by the FBOs, corporations, aviation businesses, or even private aircraft owners. By and large, the most common hangar types are T-hangars and clearspan hangars.

T-hangars are fully enclosed buildings which have individual t-shaped stalls, each capable of storing one aircraft (typically a single-engine or a light multi-engine aircraft). At MLB, box hangars also fit this description with the primary difference being the shape of the stall and that aircraft access is only from one side of the structure. Clearspan hangars are capable of holding multiple aircraft and commonly have an attached office, shop, and/or storage space. These hangars, when used for long-term storage of multiple aircraft with different owners, are commonly referred to as “community hangars.” The executive hangars at MLB are typically larger than the box hangars and can therefore accommodate larger GA aircraft.

In 2014, approximately 75 percent of MLB’s based aircraft were stored in hangars. This figure is somewhat variable given the occupancy rates and different mix of aircraft that can be stored in the larger hangars. In some cases, a large hangar may be used only for maintenance, but if some space is available, it may also be used for the storage of based and/or itinerant aircraft. For example, FIT Aviation’s large clearspan hangar is primarily used for the maintenance of their training fleet and FBO customers. Regardless, if additional facilities are constructed, it is expected that at a minimum, the current high percentage of based aircraft stored in hangars will continue throughout the planning period. In fact, the potential for an increased share of future aircraft stored in hangars is possible given a large percent of the based aircraft currently parked on an apron belong to FIT Aviation. In other words, it is likely that a larger share of the new based aircraft (presumably non-FIT) will want hangar space.

Of the based aircraft currently stored in hangars, a majority are in T-hangars and box hangars. However, as indicated in the activity forecasts, the most noticeable changes for the future based aircraft fleet mix will be an increase in business jets and rotorcraft. So while the overall future fleet mix will still be predominately single-engine, there will be an increased demand at MLB for executive hangars that can accommodate business jets and helicopters. This is supported by the fact that Atlantic Jet Center and Baer Air have both expressed the need for additional large clearspan hangar space.

Given the projected fleet mix changes, there will still be a demand for additional T-hangar space at MLB. In fact, a majority of the 59 additional single-engine and 30 additional multi-engine based aircraft expected during the planning period would likely store their aircraft in T-hangars or community hangars. During the inventory of this Master Plan update, approximately 45 T-hangar units were available on the north side of the airfield. Therefore, the need to provide additional T-hangar storage space is somewhat limited. However, new T-hangar units, including some to replace the older existing structures need to be considered in the airport development alternatives. Specifically, the six T-hangar buildings to the southwest of the passenger terminal area will need to be replaced during the planning period. While these six structures are owned and maintained by the MAA, another in this area has already been demolished due to its deteriorating condition.

As indicated, the number of aircraft stored in clearspan hangars can vary depending on the size and who owns the hangar. Some clearspan hangars may house a multitude of aircraft if operated by an aviation business such as a maintenance facility or FBO. Conversely, it is possible for some private or corporate clearspan hangars to store only one or two aircraft. At minimum, a sufficient mix of

large and small clearspan hangars should be planned to accommodate the additional larger based aircraft expected.

Because of the different owners, sites, and uses, a number of hangar facilities will be reflected on the final ALP drawing set. This provides flexibility for MAA and its GA tenants when moving forward with the development of any hangar facilities. Ultimately, each will be based on the availability of funds, demand at that time, and the business decisions of the FBO/tenants using these facilities.

4.11.2 General Aviation Parking Aprons

For planning purposes, based and itinerant aircraft apron requirements are considered separately since they serve different functions. However, since parking aprons typically accommodate both itinerant and based aircraft, the two will be analyzed independently and then combined. Aircraft parking aprons are also usually divided into areas for small versus large aircraft. Areas for small aircraft are typically designed for ADG I or II with tie-down capability sized for the single-engine and light multi-engine aircraft. Large aircraft apron space includes the area necessary to park the larger turboprop multi-engine and business jet aircraft, as well as rotorcraft. The methods used to estimate the minimum apron space required for based and itinerant aircraft parking are provided in the following sections.

4.11.2.1 Methodology for Based Aircraft Parking Area

Continuing the previous hangar utilization estimate, approximately 25 percent of the based aircraft at MLB were parked on aprons in 2014. Of these, an overwhelming majority was single-engine and light multi-engine aircraft, including FIT Aviation's training fleet. A minimum area of 300 square yards has been applied for each based aircraft expected to be parked on an apron. For planning purposes, this value is then typically increased ten percent to account for changes that might occur before construction is complete. The result using this methodology is that 19,470 square yards of apron space is required for the based aircraft stored outside in 2014.

As stated in the previous section, it is assumed that at a minimum, the same percentage of the based aircraft parking demand will be met through the use of hangar facilities by the end of the planning period. It was also assumed that the additional aircraft stored outside will continue to primarily be the smaller aircraft expected. Therefore, a minimum of 31,020 square yards of apron space will be required for the based aircraft expected at PAL-3.

4.11.2.2 Methodology for Itinerant Aircraft Parking Area

Itinerant apron space is intended for relatively short-term parking periods, usually less than 24 hours (possibly overnight), as they are primarily for transient aircraft. When possible, such aprons should also be located as to provide easy access to the FBO terminal areas, aviation fuel services, and/or ground transportation facilities. For planning purposes, a preferred approach is to calculate the total number of peak day itinerant aircraft that can be expected on the apron at any given time.

For MLB this was calculated using the peak activity, local versus itinerant, and operational fleet mix figures from the approved aviation activity forecasts. Once calculated, a minimum area of 360 square yards per itinerant aircraft was applied for each small aircraft, while the space for the larger aircraft was based on the physical footprint of the current (Gulfstream G450) and future (Boeing Business Jet) critical aircraft for the GA apron areas, which ranged from 1,200 to 2,000 square yards. While it is not anticipated that every future large aircraft will be a big as the critical aircraft, this methodology is still considered conservative, given the ADG II and III taxilane standards that will also be required for the movement of these aircraft in and around the apron areas. This methodology resulted in 41,120 square yards of itinerant apron space required in 2014 and 106,920 square yards for PAL-3.

4.11.2.3 General Aviation Aircraft Parking Area Requirements

As reflected in **Table 4-22**, the combined GA apron space needed in 2014 was 60,590 square yards and 137,940 square yards will be required for PAL-3. The table also reflects the combined apron area of 67,700 square yards available in 2014 for the three primary FBOs (Atlantic Jet Center, Baer Air, and FIT Aviation). This amount was reduced from the calculated needs in order to estimate the additional aircraft parking apron space required to meet the demands of PAL-3.

TABLE 4-22
GENERAL AVIATION AIRCRAFT PARKING APRON REQUIREMENTS

	2014	PAL-3
Based Aircraft		
Approximate Number of Aircraft on Apron	59	94
Recommended Area for Based Aircraft (subtotal)	19,470 SY	31,020 SY
Itinerant Aircraft		
Small Aircraft on Peak Day	67	97
Area Required for Small Aircraft	24,120 SY	34,920 SY
Large Aircraft on Peak Day	17	45
Area Required for Large Aircraft	17,000 SY	72,000 SY
Minimum Area Required for Itinerant Aircraft (subtotal)	41,120 SY	106,920 SY
Apron Space Requirements		
Total Area for Based and Itinerant Aircraft	60,590 SY	137,940 SY
Combined FBO Apron Areas Available in 2014	67,700 SY	67,700 SY
Surplus (+) / Deficit (-)	+7,110 SY	-70,240 SY

SY = Square Yards

SOURCE: ESA, 2016

It is worth noting that the apron area shown available in 2014 were based on the aircraft parking utilization at that time and included the interior taxilanes for circulation. Any apron edge taxilanes or taxiways adjacent to these areas were not included. This is an important point since the methodology indicates that no additional aircraft parking area is currently required. The fact is that

some additional space is already required as operators of the different facilities frequently park aircraft in areas that were initially intended for the movement of aircraft or in areas not officially recognized as an aircraft parking area.Development options to provide the additional GA apron space identified will include expanding into new areas of the airport property. Because this methodology is based on minimum requirements and the current FAA guidance recognizes that apron areas vary from airport to airport, the ALP will depict more future paved apron space than that calculated for PAL-3. Additional space beyond the requirements estimated will be required given that the combined area is for three different FBO facilities. Many of these apron improvements will depend on the availability of funds, demand at that time, or even the business decisions of the tenants expected to utilize the facilities.

For the existing FBO aprons, two were evaluated during the latest pavement inspections conducted by FDOT in March 2015. As with other airfield pavements, many of the latest PCI ratings differ from those of the 2012 report, which were documented in the existing conditions chapter. In the 2015 report, the west side of the North Apron used by Atlantic Jet was recommended by FDOT for rehabilitation since it has PCIs as low as 67 (Fair). The central portion of this apron was recommended for rehabilitation as soon as possible as it has PCIs as low as 59 (Fair). For both the pavement strength needs to be based on the future use as these areas are continuously used by larger and heavier aircraft than originally intended. The east side of this apron area (adjacent to the hangars) was not evaluated; however, it too should be rehabilitated and the pavement strength increased to serve the larger aircraft operating in this area.

On the south side of the airfield, a rehabilitation of the Central Apron used by FIT Aviation was recommended as the 2015 report documented the pavement with a PCI of 80 (Satisfactory). The Northeast Apron used by Baer Air was not evaluated in the FDOT study. While this pavement is considered to be in good condition, it will likely require rehabilitation before the end of the 20-year planning period.

While not used by any of the FBOs, two other apron areas which are categorized under general aviation were evaluated in the 2015 pavement report. These included the West Apron and East Apron areas. The pavement in the West Apron has come to the end of its useful life as the PCIs range from 0 to 5 (Failed). Depending on how this area between the passenger terminal and south T-hangars is utilized in the future, a complete reconstruction will need to be considered. Conversely, the East Apron area has a PCI of 100 (Good) as this area includes both new and newly reconstructed pavements for the MRO facility.

A number of apron floodlights have been installed around the airport facilities. For the airside facilities these either consist of fixtures mounted to the sides of the buildings or on masts around the apron areas. The continued installation of apron floodlighting is recommended as it provides additional safety for night operations and security for aircraft parking.

4.12 Airside Facilities

The following sections address different airside facilities required to support the expected activity. These include the requirements for air traffic control, aircraft rescue and fire fighting, aviation fuel storage, and other support facilities.

4.12.1 Air Traffic Control

As noted in the existing conditions, the current ATCT structure has exceeded its useful life and does not meet current FAA requirements for line-of-sight. A new tower has been approved just to the southeast of the existing site, with construction expected to begin by mid-2016. The new tower structure will be 108 feet AGL, which creates an overall controller eye height of 133 feet AMSL for the site. Additionally, the new tower will provide the space needed to accommodate the various duties of the air traffic controllers and related equipment, including an elevator for the building.

4.12.2 Aircraft Rescue and Fire Fighting

The current Aircraft Rescue and Fire Fighting (ARFF) facility at MLB, a Class I airport,[10] is located on the south side of the airport to the southeast of the Taxiway A and Taxiway Q intersection. ARFF personnel are contracted through the City of Melbourne. The minimum requirements for this facility are addressed below.

4.12.2.1 Index Determination

14 CFR Part 139 establishes the ARFF index required based on the length of the longest air carrier aircraft making an average of five or more daily departures. Presently, the longest aircraft at MLB meeting these parameters all fall within Index C, which includes aircraft at least 126 feet, but less than 159 feet in length. This index encompasses every domestic commercial passenger service aircraft regularly operating at MLB, including the Boeing 757-200 at 155.2 feet long.

The future air carrier activity is expected to include an increased level of international commercial passenger service with a mix of both Index D (Boeing 767 and 787 aircraft) and Index E (Boeing 747 and Airbus A330 aircraft) operations. However, it is not certain whether the combined activity of these aircraft will average five or more daily departures during the 20-year planning period. Therefore, the ARFF Index for MLB would remain at C, but the MAA should have a plan and the capability to expand existing ARFF facilities and capabilities to meet Index D or E requirements at such time that international passenger service at MLB approaches five or more departures per day.

4.12.2.2 Vehicles and Extinguishing Agents

Based on an ARFF Index C, the airport requires, at a minimum, either three or two vehicles with the following capabilities:

[10] Under 14 CFR Part 139, a Class I airport is an airport certificated to serve scheduled operations of large air carrier aircraft that can also serve unscheduled passenger operations of large air carrier aircraft and/or scheduled operations of small air carrier aircraft.

Three ARFF Vehicle Capabilities (Index C)

Vehicle 1	500 pounds of sodium-based dry chemical, halon 1211, or clean agent *or* 450 pounds of potassium-based dry chemical and water with a commensurate quantity of Aqueous Film Forming Foam (AFFF) to total 100 gallons for simultaneous dry chemical and AFFF application
Vehicle 2	At least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent *and* 1,500 gallons of water and the commensurate quantity of AFFF for foam production
Vehicle 3	A quantity of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by both Vehicle 2 and Vehicle 3 is at least 3,000 gallons

Two ARFF Vehicle Capabilities (Index C)

Vehicle 1	500 pounds of sodium-based dry chemical, halon 1211, or clean agent *and* 1,500 gallons of water and the commensurate quantity of AFFF for foam production
Vehicle 2	At least 500 pounds of sodium-based dry chemical, halon 1211, or clean agent *and* A quantity of water and the commensurate quantity of AFFF so that the total quantity of water for foam production carried by both Vehicle 1 and Vehicle 2 is at least 3,000 gallons

SOURCE: Title 14 CFR Part 139, Certification of Airports.

Under Index B, C, D or E. each ARFF vehicle with a capacity of at least 500 gallons of water for foam production must be equipped with a turret. Vehicle turret discharge rate should be:

- At least 500 gallons per minute, but not more than 1,000 gallons per minute for vehicles with 500 to 2,000-gallon water tank capacities.
- At least 600 gallons per minute, but not more than 1,200 gallons per minute for vehicles with minimum 2,000-gallon water tank capacities.

For each ARFF vehicle required to carry dry chemical, halon 1211, or clean agent for compliance must meet the following discharge rates:

- Dry chemical, halon 1211, or clean agent through a hand line – 5 pounds per second.
- Dry chemical, halon 1211, or clean agent through a turret – 16 pounds per second.

The three ARFF vehicles at MLB meet Index C requirements and also allow the immediate ability to provide Index D coverage. Basically, Index D requires three vehicles with the nearly the same capabilities as Index C; the only difference being the amount of water and the commensurate quantity of AFFF for foam production carried by all three vehicles is at least 4,000 gallons (versus 3,000). To meet Index E requirements, the total foam production by all three would increase to 6,000 gallons. While the current vehicles are considered to be in good condition, it is anticipated

that the vehicles would be rehabilitated and/or replaced, as needed, during the course of the 20-year planning horizon.

4.12.2.3 Response Times

During periods of air carrier operations, 14 CFR Part 139 stipulates the following performance criteria:

- Within three minutes from the time of the alarm, at least one required ARFF vehicle must reach the midpoint of the farthest runway serving air carrier aircraft from its assigned post or reach any other specified point of comparable distance on the movement area that is available to air carriers and begin application of extinguishing agent.
- Within four minutes from the time of alarm, all other required vehicles must reach the point specified above from their assigned posts and begin application of an extinguishing agent.

The current ARFF facility has demonstrated the ability to provide the response times mentioned above. However, future recommended changes to runway lengths, taxiway system improvements, and airfield facilities should include provisions to maintain response times. Minimum standards affecting the response time of an ARFF facility are outlined in FAA AC 150/5210-15A, *Airport Rescue Firefighting Station Building Design*. These are outlined below and should be considered when evaluating future changes to the airfield facilities:

- Immediate, straight access towards the airside.
- Unimpeded access routes with a minimum of turns to the airfield network and aircraft aprons.
- Direct access to the terminal aprons minimizing the crossing of active runways, taxiways, or difficult terrain.
- Noninterference with the ATCT line-of-sight.
- Maximum surveillance of the airfield.
- Future expansion of the ARFF station without:
  - limiting or reducing airport surveillance.
  - blocking fire traffic lanes.
  - impacting adjacent roads, buildings, aircraft pavement/parking areas, and ATCT line-of-sight unless the structure or paved area is to be eliminated for other reasons.
  - requiring significant structural changes to the ARFF station itself.
- Planned airfield improvements that will not create emergency response runs that will negatively impact 14 CFR Part 139 response time requirements. However, in this event, an additional (satellite) ARFF station(s) may provide an alternative.
- Non-interference by ARFF vehicles or the ARFF station’s communications equipment or with navigational facilities.
- Minimum obstructions or interference from existing facilities or uses, such as:
  - access roads.

  - aircraft fuel storage areas.
  - aircraft taxiing operations or parking areas.
- Ease of connection to and integration with the airport's security system.

4.12.3 Aviation Fuel Supply and Service

As outlined in Section 2.6, there are eleven aviation fuel storage tanks at the airport. Most of the tanks are privately-owned and are operated by FBOs and tenants. The privately-owned tanks range in size from 10,000 gallons to 20,000 gallons in size. The MAA owns a fuel storage facility (fuel farm), which is located on the south side of airport, west of Taxiway V. The fuel farm is operated by Menzies Aviation (formerly Menzies Aviation). For the privately-owned tanks, any decision to upgrade equipment and expand fuel storage capacity is a business decision of each tank owner/operator and will not be evaluated in this Master Plan. In this section, consideration is given to the fuel farm because it supplies the needs of the commercial passenger airlines, a number of airport tenants (including FIT Aviation and one of the three FBOs), and military aircraft.

The fuel farm presently has four large aboveground tanks with an aggregate capacity of 100,000 gallons of Jet-A, 30,000 gallons of Avgas, and 30,000 gallons of JP-8 aviation fuel. MAA owns the Avgas Jet-A tank and two Jet-A tanks. Menzies Aviation owns the single JP-8 tank. The fuel farm infrastructure appears to be in good condition and very well maintained. The area is lighted, fenced, and includes access for the maneuvering of tanker trucks on the landside and aircraft fuel trucks on the airside. There is space within the current fuel farm to accommodate up to three additional 50,000 gallon tanks.

Interviews conducted for this Master Plan update indicate a need to increase the capacity of Jet-A fuel storage at the fuel farm. Menzies Aviation reported that it averages five tanker truck deliveries each week and had an average fuel flow of approximately 200,000 gallons per month in 2014. Menzies Aviation also noted that the community tanks store fuel purchased by different tenants and the airlines. This occasionally presents a challenge on busy days prior to a scheduled fuel delivery when one or more parties need more than their "allotted" share or when a large aircraft (such as a Boeing 747 at MLB for maintenance) needs fuel to return to their origin city. In May 2015, the MAA accepted a grant from the FDOT to install two additional 50,000-gallon Jet-A tanks, rehabilitate the two existing Jet-A tanks, and clean and reseal the concrete pad and containment wall. This would increase Jet-A fuel storage capacity within at the fuel farm from 100,000 gallons to 200,000 gallons.

The interview with FIT Aviation documented their desire to have a guaranteed 30-day supply available. This need traces back to times when their aircraft utilization was higher but the ability to get additional Avgas was limited. Therefore, the third (and final) 50,000-gallon tank space in the MAA fuel farm should be reserved for additional Avgas storage.

Consideration should also be made with respect to the international charter potential. The introduction of these wide-body aircraft on longer international routes will have an impact on the Jet-A supply even after additional capacity is added under the current fuel farm expansion work.

This is especially true if the High-Growth scenario (substantially increased international charter flights) is achieved. Therefore, the ability to provide space for two additional 50,000-gallon Jet-A tanks (beyond the current tank space available) needs to be included in the airport development alternatives.

The current MAA fuel farm location is considered adequate, with the closest facilities being the hangar and fuel tanks of South Brevard Aviation. These are located approximately 200 feet across Taxiway V. It is recommended that the existing and future aboveground tanks be protected from the elements by a canopy or roof system. In addition, space around this fuel farm should be reserved for future expansion, should the demand for fuel change during the planning period. Any additions or expansions to the fuel farm will need to comply with the most recent version of National Fire Protection Agency (NFPA) 30, *Flammable and Combustible Liquids Code* as well as the applicable Environmental Protection Agency (EPA) requirements.

A common concern among many GA operators includes the limited FBO services on the south side of the airfield. These users have requested that a self-service Avgas pump be located on the south side of the airport. Such a facility typically includes the pump along with a credit card machine, on an island, in the middle of an apron. The self-service facility must then be close enough to a fuel farm or have its own tanks for fuel storage. An evaluation of the potential to site a self-service Avgas facility on the airfield will be considered as part of the airport development alternatives.

4.12.4 Airfield Lighting Vault

The airfield lighting vault is located south of Taxiway A, between the ARFF station and current ATCT. An addition to the original structure provides a total of approximately 1,200 square feet for the various regulators, backup generator and electrical equipment associated with the airfield lighting circuits and navigational aids. Overall, the structure is in good condition and has the space to accommodate the additional equipment envisioned over the planning period. This is especially true as some of the older and larger regulators are eventually replaced.

The vault however does require climate control. While the current structure has mechanical ventilation, this system allows outside dirt (primarily in the form of fine dust) and moisture to enter the building. This as well as the extreme heat experienced most of the year is hard on the electrical equipment. A project to add climate control equipment to the vault would also need to include the ability to insulate while at the same time providing the fresh airflow required for the backup generator, such as a replacement or improvement to the current louver system.

On the airside of the vault is a 175 square foot portable shed that provides limited workshop space and the storage of spare lighting equipment. A larger replacement building with climate control is recommended.

4.12.5 Airport Operations and Maintenance Facilities

Three buildings in the southeast corner of the airfield support the airport operations and maintenance. The airport maintenance garage is approximately 3,750 square feet and has access

to the secure side of the airport security fence. An airport operations and maintenance building with approximately 5,375 square feet is located just south, entirely on the landside of the airport property. The airport also utilizes a portion of the older air cargo building in this area, which also has access to the secure side of the airfield. Combined these facilities do not adequately provide the space required for the management, maintenance, and storage of airport equipment.

A larger consolidated structure or two bigger replacement facilities are recommended. A primary space requirement includes the need for approximately 30,000 square feet of warehouse space for the storage of the airport's various equipment, such as mowers, power brooms, runway closure signs, etc. An additional 20,000 square feet would also be required to provide a proper machine shop, fleet maintenance area, and supporting office space. For the fleet maintenance space, five bays providing four vehicle/equipment lifts are needed. The consolidated facilities would also require a 10,000 gallon above ground unleaded gas tank, a 10,000 gallon above ground diesel tank, and wash rack to support daily activities.

4.13 Land Acquisition

Whenever possible, the option to acquire additional property for aviation related development and to ensure future land use compatibility must be considered. Even though there are options to develop the current airport property, the potential for non-compatible development around the airport will always exist. In short, as development pressure builds in the areas surrounding the airport, the ability for the MAA to acquire any additional land diminishes. For these reasons, consideration must be given to the identification of a future property envelope that the airport should secure to address demand and development needs beyond the master planning horizon.

At a minimum, the ability to obtain control of the property within the future RPZs needs to be evaluated as this is a specific requirement set forth in FAA AC 150/5300-13A, Change 1. If MAA cannot purchase the property within the areas of the existing and future RPZs, then it must ensure the proper land use controls or agreements such as avigation easements are in place to limit incompatible land uses. In addition to the existing RPZs, the potential land issues associated with any proposed airport improvement will depend on the final recommended development option. Therefore, each will be evaluated as part of the airport alternatives of this Master Plan update to identify any land acquisition or other compatibility requirements.

4.14 Summary of Facility Requirements

Table 4-23 provides a general summary of the facility requirements that were determined necessary to satisfy the approved aviation demand forecasts. Essentially, this table includes the minimum improvements required over the 20-year planning period. Some additional facilities will also be planned and included as part of the final ALP drawing set and Capital Improvement Program to enhance the airport. The order in which these improvements are listed does not have any relation to the priority or phasing of such projects.

TABLE 4-23
MINIMUM FACILITY REQUIREMENTS

Category	Proposed Improvements
Runways	Extend Runway 9R/27L up to 11,600 feet with HIRLs
	Extend Runway 9L/27R up to 7,000 feet with paved shoulders and MIRLs
	Add Blast Pads to Runway 9L/27R
	Rehabilitate Runways 9R/27L, 9L/27R, and 5/23
	Periodic Runway Pavement Maintenance
	Obstruction Removal and Marking
Taxiways	Re-Align Taxiway C between Runway 9L/27R and Taxiway A
	Re-Align Taxiway C between Taxiway F and West Apron
	Widen Taxiway K between Taxiway M and Runway 9L
	Rehabilitate Taxiways and T-hangar Taxilanes
	Parallel Taxiway South of Runway 9L/27R
	Additional Exit Taxiways
	Taxiway/Taxilane Access to New Facilities
	Airport Signage Plan for Taxiway Designations
	Aircraft Run-up or Bypass Areas
	Periodic Taxiway Pavement Maintenance
Airfield	Replace Runway and Taxiway Lighting with LED Fixtures
	Periodic Remarking of All Airfield Pavements
	Adjust Distance Remaining Signs for Ultimate Parallel Runway Lengths
	Relocate MALSR to Runway 9R
	Unidirectional REILs on both ends of Runway 9L/27R
	Replace Visual Glideslope Indicators
	Lighted Public Heliport(s)
Airport Facilities	New Airport Traffic Control Tower
	Passenger Terminal Building Renovation
	Passenger Terminal Building and Apron Expansion
	All-Cargo Carrier Aircraft Parking Apron (at least 14,000 SY)
	Replace Southside T-hangars (48 units)
	Additional T-hangar Facilities
	Additional Clearspan Hangars
	Additional Aircraft Parking Apron Space (at least 70,000 SY)
	Rehabilitate North Apron Aircraft Parking Apron
	Replace ARFF Vehicle(s)
	Additional Aviation Fuel Storage (Jet-A and Avgas)
	Self-Service Avgas Facility on South Side
	Improve Airfield Lighting Vault Facilities
	Expand Airport Operations and Maintenance Facilities
Other Facilities	Increase Public Automobile Parking Capacity and Improve Access
	Provide Additional Rental Car Parking
	Improve Rental Car Support Facilities
	Landside Access and Parking to New Development Areas
	Miscellaneous Land Acquisitions

SOURCE: ESA, 2016.

CHAPTER 5

Environmental Overview

CHAPTER 5
Environmental Overview

5.1 Introduction

Federal Aviation Administration (FAA) guidance encourages environmental factors in airport master planning to "help the sponsor thoroughly evaluate airport development alternatives and to provide information that will help expedite subsequent environmental processing."[1] As noted in the Florida Department of Transportation (FDOT) *2016 Guidebook for Airport Master Planning*, there are different environmental processes for projects that are funded by the FAA or FDOT. However, both agencies clearly note that it is not the intent of a Master Plan to complete the federal and state environmental review processes. Instead, the information should identify and set the stage for understanding what future environmental processes may be needed.

This chapter provides an overview of known environmental resources that will be considered during the identification and evaluation of development alternatives in this Master Plan update. The types of environmental reviews are addressed at the end of this chapter while potential environmental impacts associated with specific conceptual development alternatives are discussed in Chapter 6. The environmental resources discussed in this chapter include many of those identified in FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, and FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*. This overview does not constitute an Environmental Assessment (EA); instead, it is intended to help prepare for any NEPA review that may be required by the FAA for future projects.

5.2 Air Quality

The federal *Clean Air Act*, as amended, required the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for principle air pollutants considered harmful to public health and the environment. Those areas where the NAAQS are not met are designated as "nonattainment." Brevard County, Florida, is classified as "attainment" for all criteria air pollutants.[2] Emission sources at MLB, which are typical of airports, include aircraft engines, ground support equipment, auxiliary power units, motor vehicles, temporary use of construction equipment, and various stationary sources. Stationary sources at MLB include, back-up electric power generators and fuel storage tanks.

1 FAA Advisory Circular 150/5070-6B, *Airport Master Plans*. Change 2. January 27, 2015.

2 Environmental Protection Agency "Green Book." https://www3.epa.gov/airquality/greenbook/. Accessed July 2016.

The existing and projected number of passengers and aircraft operations at MLB, in conjunction with the County's NAAQS attainment status, indicates that continued development at the airport is likely to not substantially affect air quality, exceed thresholds that require detailed air quality analyses, or require conformance with a State Implementation Plan.[3] Future airport development projects that require NEPA review will consider the project's effect on air quality. Certain projects and tenant activities, such as operating paint booths, will need to comply with applicable regulations and permit requirements.

5.3 Biological Resources

FAA Order 1050.1F identifies factors which determine impacts on biological resources such as plant communities, wildlife, and protected species and their habitat. These include:

- A long-term or permanent loss of unlisted plant or wildlife species.
- Adverse impacts to special status species or their habitats.
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species' habitats or their populations.
- Adverse impacts on a species' reproductive success rates, natural mortality rates, non-natural mortality, or ability to sustain the minimum population levels required for population maintenance.

In addition to assessing impacts under NEPA, airport development projects are subject to other federal and state laws associated with wildlife and protected species. Most notable is the federal *Endangered Species Act*, which protects and recovers imperiled species and the ecosystems upon which they depend.[4] The FAA and/or other federal agencies that may be involved with airport development projects at MLB are required to determine if their action(s) would affect listed species.[5]

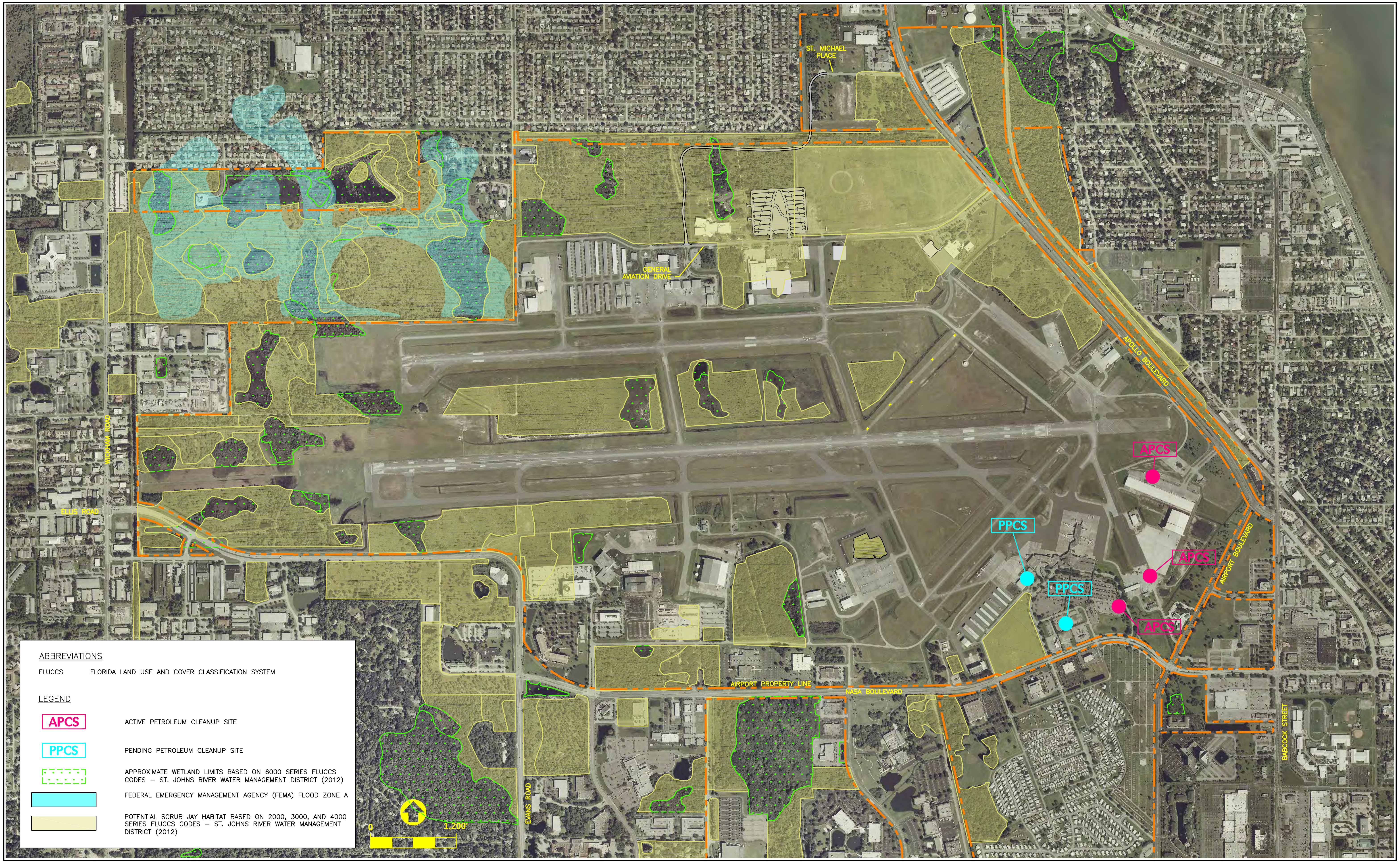
Previous environmental studies and surveys have identified suitable habitat at MLB for federal and state-listed, species. Of the various federal and state-listed species that may be found in the vicinity of MLB, those with the highest potential to occur within future airfield development areas include the Florida scrub jay (*Aphelocoma coerulescens*), gopher tortoise (*Gopherus polyphemus*), Eastern indigo snake (*Drymarchon couperi*), and wood stork (*Mycteria americana*).

Florida scrub jay habitat is generally associated with upland oak scrub that occurs on well-drained sandy soils. The scrub jay is classified as Threatened at both the federal and state level due to loss, fragmentation, and degradation of habitats throughout Florida. Areas with the potential for scrub jay habitat on and around the airport have been identified on **Figure 5-1**. This large area is based on the most recent 2000, 3000, and 4000 series codes of the Florida Land Use and Cover

3 Nonattainment areas are required to have a State Implementation Plan (SIP) that prescribes mitigation measures and timelines necessary to bring ambient concentrations of criteria pollutants below the NAAQS.

4 *Endangered Species Act*. 16 U.S. Code § 1531-1544. December 28, 1973. As amended 1976-1982, 1984, and 1988.

5 50 CFR Part 402, *Interagency Cooperation – Endangered Species Act of 1973, as Amended*, Subpart B.



Source: COMPILED BY ESA, 2016

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FIGURE 5-1

ENVIRONMENTAL RESOURCES AND FEATURES

Classifications Systems (FLUCCS) obtained from the St. Johns River Water Management District (SJRWMD). Due to the amount of suitable habitat at MLB for this species, it is recommended that U.S. Fish and Wildlife Service (FWS) approved monitoring protocols be conducted to document existing scrub jay territories on and adjacent to airport property, in order to make appropriate removal recommendations for both aircraft safety and future airfield development.

Undeveloped portions of the airport property also provide suitable habitat for the state-listed gopher tortoise (Threatened) and federally-listed Eastern indigo snake (Threatened). Because these species cohabitate, airport development projects should be surveyed early in the planning and design process to determine if gopher tortoise burrows are present within the project site. Development and construction that would occur within 25 feet of a gopher tortoise burrow will require a state permit. If more than 25 burrows are affected, the project also requires an effect determination for the federally-listed Eastern indigo snake.

The federally and state-listed (Endangered) wood stork is a species that typically utilize shallow waters, including wetlands, coastal areas, ponds, ditches, creeks, and impounded water areas, for foraging opportunities. MLB is located within a FWS designated Wood Stork Core Foraging Area; therefore, given the amount of existing wetlands and man-made drainage features on-airport property, future development projects that impact appropriate wood stork foraging habitat may require mitigation. If required, wood stork habitat mitigation is typically accomplished in conjunction with wetland mitigation.

5.4 Department of Transportation Act: Section 4(f) and Other Environmentally Sensitive Public Lands

Section 4(f) of the *Department of Transportation Act of 1966* (re-codified and renumbered as Section 303(c) of 49 United States Code) states that the Secretary of Transportation will not approve any program or project that requires the use of publicly-owned land of a public park, recreation area; or wildlife and waterfowl refuge of national, state, or local significance; or land of an historic site of national, state, or local significance as determined by the officials having jurisdiction thereof, unless:

1. There is no feasible and prudent alternative to use of such land and such program, and
2. The program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

There are no Section 4(f) resources located on MLB property. A review of an U.S. Park Service data shows there are no historic resources listed on the National Register of Historic Places located at MLB or within one-half mile of the airport. There are no wildlife and waterfowl refuges located on or in the immediate vicinity of MLB. The Section 4(f) resources, located within one-half mile of the airport property are depicted on **Figure 5-2**.

Figure 5-2: Section 4(F) Resources within One-half Mile of Airport Property

LEGEND

A	Jimmy More Park	E	Erna Nixon Park and Nature Center
B	Oxford Ridge Park	F	Mono Pole Park
C	Lagoon Park	G	Magnolia Manor Park
D	Tradewind Park	H	Fee Avenue Park

5.5 Hazardous Materials and Waste Management

5.5.1 Hazardous Materials

Federal, state, and local laws regulate hazardous materials use, storage, transport, or disposal. Major laws and issue areas include:

- *Resources Conservation and Recovery Act (RCRA)* - hazardous waste management.
- *Hazardous and Solid Waste Amendments Act* - hazardous waste management.
- *Comprehensive Environmental Response, Compensation, and Liability Act* - cleanup of contamination.
- *Superfund Amendments and Reauthorization Act (SARA)* - cleanup of contamination.
- *Emergency Planning and Community Right-to-Know (SARA Title 111)* - business inventories and emergency response planning.

According to the Florida Department of Environmental Protection (DEP), there are five petroleum cleanup sites on-airport property. As depicted on Figure 5-1, three are active cleanup sites while the other two are pending. These sites were contaminated by discharges of petroleum and petroleum products from above ground and underground storage systems. All five of these sites are located in the southeastern corner of airport property. No other hazardous cleanup sites are located on-airport property.

The RCRA on-line database lists facilities that store, generate, transport, treat, and dispose of hazardous wastes (typically waste oils, paint solvents, and other hazardous materials). It should be noted that sites included in this database do not necessarily involve contamination. Several RCRA sites are located on or adjacent to MLB; the RCRA sites located on or immediately adjacent to proposed development sites are summarized in **Table 5-1**.

National Priority List (NPL) sites, also referred to as "Superfund" sites, are considered by EPA to have the most significant public health and environmental risks to neighboring areas. A review of EPA on-line databases did not reveal any NPL sites or facilities on or in the vicinity of MLB.

TABLE 5-1
RESOURCES CONSERVATION AND RECOVERY ACT SITES

Handler ID	Name	Generator Type	Compliance/ Enforcement Issues[1]
FLR000057232	Aerographix MLB Worksite	Conditionally Exempt Small Quantity Generator	None
FLR000175943	AAR Airlift Group Inc.	Other - Inactive	None
FLR000098301	Aviation Worldwide Services LLC.	Conditionally Exempt Small Quantity Generator	None
FLR000200204	Embraer	Conditionally Exempt Small Quantity Generator	None
FLR000166561	Embraer Executive Aircraft Inc.	Large Quantity Generator	Compliant (except two quarters in 2015). No enforcement actions noted in database.
FLR000213066	Embraer Engineering & Technology Center	Conditionally Exempt Small Quantity Generator	None
FLR000152678	Royal Atlantic Aviation	Conditionally Exempt Small Quantity Generator	None
FLR000118216	TSA Administration at Melbourne International	Other - Inactive	None
FLD137638896	Delta Air Lines Melbourne	Conditionally Exempt Small Quantity Generator	None
FLD982106635	Northrop Grumman Corporation	Small Quantity Generator	None
FLD982157463	ARK Electronic Products	Other - Inactive	None
FLD984262816	TSA at Melbourne International	Conditionally Exempt Small Quantity Generator	None
FLT020071452	Gryphon Group International, Inc.	Conditionally Exempt Small Quantity Generator	None
FLTMP9404689	Hertz Rent-A-Car	Conditionally Exempt Small Quantity Generator	None

1. Compliance and enforcement information available in the EPA ECHO report only available for previous 5-year period.

SOURCE: EPA, 2016.

5.5.2 Waste Management

The *FAA Modernization and Reform Act of 2012* included a new requirement for airport master plans to address recycling by:

- Assessing the feasibility of solid waste recycling at the airport;
- minimizing the generation of waste at the airport;
- identifying operations and maintenance requirements;
- reviewing waste management contracts; and
- identifying the potential for cost savings or generation of revenue.

The MLB Recycling, Reuse, and Waste Reduction Plan (RRWRP) includes a review of the airport's waste management and recycling throughout the terminal and airfield, as well as a review of tenant practices. The RRWRP prepared as part of this Master Plan update is included in **Appendix C**.

Initiatives were recommended that would advance MLB's waste reduction and recycling efforts. These initiatives include:

- Formalize and broaden the recycling program including incentivizing waste diversion and recycling and formally tracking key performance indicators.
- Develop an awareness campaign to educate passengers and employees about proper recycling practices.
- Periodic monitoring of the waste reduction and recycling program.
- Develop environmentally preferable purchasing procedures.
- Provide additional recycling bins co-located with waste receptacles.
- Provide high-efficiency hand dryers to reduce paper towel use.
- Improve handling of deplaned waste to ensure deplaned waste is appropriately recycled.
- Enhance tenant engagement to consolidate materials and improve economies of scale.
- Evaluate feasibility of organics processing; this could be coordinated with an existing tenant that has its own composting or anaerobic digestion program.
- Update contract language to establish waste diversion or recycling goals for all tenants.
- Host a periodic universal waste collection day for employees, tenants, and the local community to drop off items such as batteries, lightbulbs, and pesticides.
- Charitable donations, specifically, collecting materials left behind at the TSA checkpoint or unclaimed lost and found items to local charities.

A more detailed explanation of each of these initiatives is included as part of the RRWRP in **Appendix C**.

5.6 Historical, Archaeological, and Cultural Resources

Several laws and regulations require that possible effects on historic, archaeological, and cultural resources be considered during the planning and execution of federally-funded projects. The primary laws that pertain to the treatment of historic, architectural, archaeological, and cultural resources during environmental analyses are the *National Historic Preservation Act* (NHPA), the *Archaeological Resources Protection Act*, and the *Native Graves Protection and Repatriation Act*. Historic, architectural, archaeological, and cultural resources may include archaeological sites, buildings, structures, objects, districts, works of art, architecture, and natural features that were important in past human events. They may consist of physical remains, but also may include areas where significant human events occurred, even though evidence of the events no longer exists.

A review of the EPA's NEPAssist database and the National Register of Historic Properties (NRHP) shows no NHRP-listed historical properties located at MLB or within one-half mile of the airport boundary. Prior studies at MLB, as well as past coordination with the Florida State Historic Preservation Officer indicate there is one recorded archaeological resource on-airport property. The resource is a Quonset hut made of corrugated metal that dates to the 1950s (BR908 Florida Master Site File). The structure is in a deteriorated condition and was considered beyond salvageable condition. The resource is not listed, or considered eligible for listing, on the NRHP.

5.7 Energy Supply and Natural Resource Use

The Florida Power and Light Company, the electric power supplier to MLB, has a network capable of serving existing and prospective tenants at the airport. Florida City Gas provides natural gas to MLB. The proposed airport improvements projects would require lighting; power for specialized equipment, tools, and processes; office equipment; and air conditioning. Local power utility requirements would include electric and natural gas. Overall, there is sufficient capacity to accommodate the projects envisioned in this Master Plan update. No substantial energy-related impacts or issues regarding the ability to supply energy to MLB were noted during any recent development projects.

Although a threshold has not been specifically identified by the FAA, it is not anticipated that the airport improvements or development projects being considered would have a significant impact on natural resources and energy supplies.

5.8 Noise and Compatible Land Use

In 2016, a Title 14 Code of Federal Regulations (CFR) Part 150 Noise and Land Use Compatibility Study update (Part 150 Study) was completed for MLB. The Part 150 Study provided the Melbourne Airport Authority (MAA) and community an opportunity to address noise and land use compatibility related to the operation of the airport. The objectives of the study were to identify MLB's existing operational procedures and the determination of the existing and future noise conditions around the airport as Noise Exposure Maps (NEMs). The Part 150 Study also identified and evaluated potential future operational, land use, and program management measures that could be implemented to reduce noise impacts and the development of a Noise Compatibility Program

that consists of the recommendations made by the MAA to alleviate future noise impacts to the surrounding communities.

5.8.1 Noise Exposure Maps

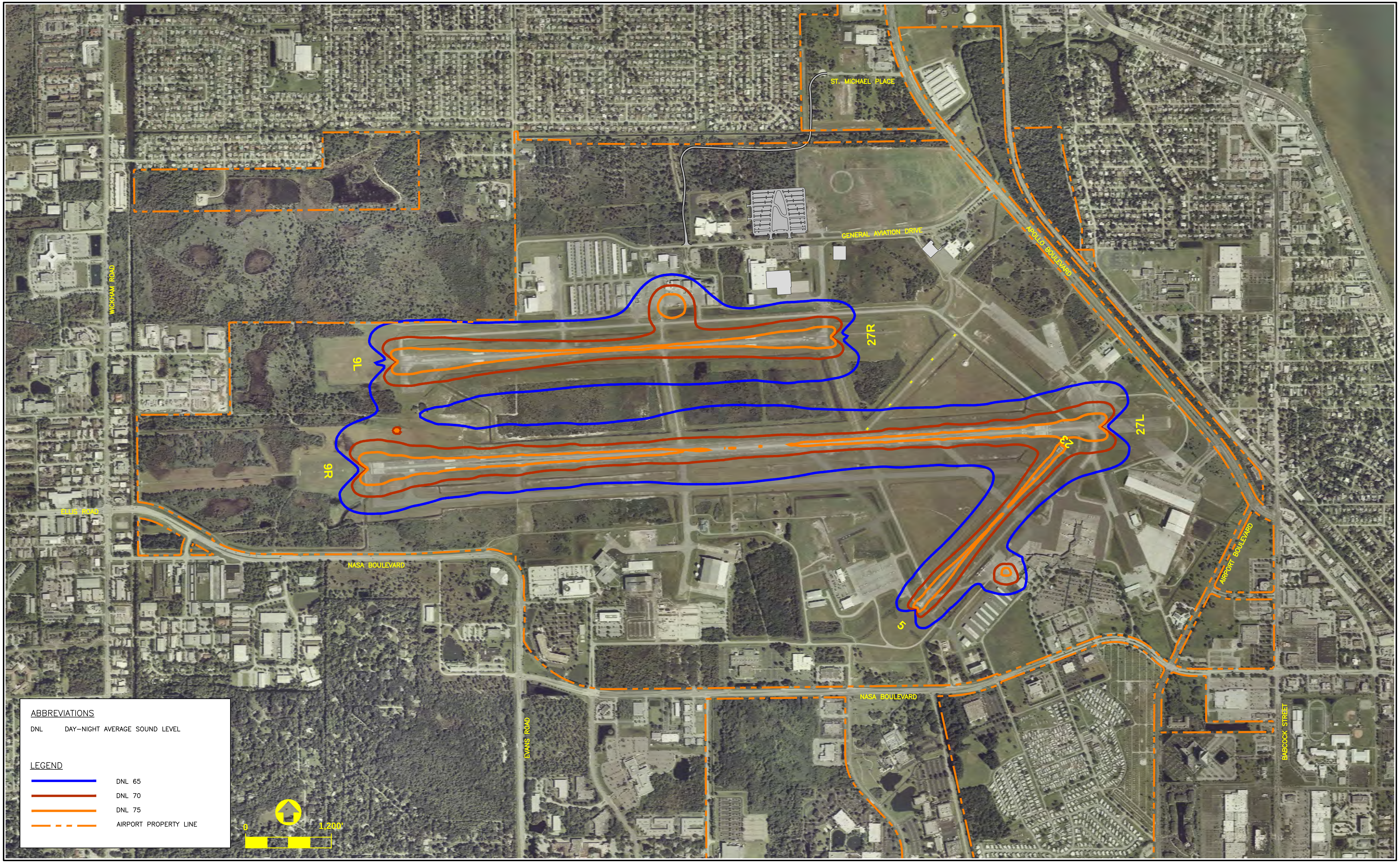
The Part 150 Study developed NEMs for the 2016 (existing condition) and 2021 (future condition). The 2021 future condition NEM reflected aircraft operations based on the forecast developed and approved for this Master Plan update. The 2016 and 2021 noise exposure contours from the Part 150 Study NEMs are included as **Figures 5-3 and 5-4**. The Day-Night Average Sound Level (DNL) 65, 70, and 75 decibel noise contours are required by the FAA for inclusion in the Part 150 Study. The 2021 DNL 65+ contours predominantly remain on-airport property, with less than two acres of compatible off-airport industrial land northwest of the airport within the DNL 65 contour.

The future condition NEM shows that the anticipated continued growth in aviation activity at MLB, in regard to land use compatibility, would not have off-airport impacts on any noise-sensitive resources. However, each future airport development project that requires NEPA review would consider the potential of the project to alter aircraft noise exposure in the vicinity of MLB. In cases where a noise analysis is required, noise impacts and any required mitigation would be disclosed.

5.8.2 Noise Compatibility Study

The Noise Compatibility Program (NCP) evaluated and recommended measures for implementation as a part of the Part 150 Study. There are two primary ways to reduce aircraft noise exposure on noise sensitive areas surrounding an airport; operational measures and land use measures. The first includes modifications to how the aircraft are routed or how they are operated in an effort to lessen the impact on non-compatible land uses. The second includes managing how land is developed around the airport and promoting development that is compatible with airport operations.

The overall objective of the NCP for MLB was to maintain aircraft noise and off-airport land use compatibility through the continued efforts of noise abatement procedures and implementation of noise mitigation measures. Through the analysis of existing and future noise conditions, the direct input from a wide variety of interests including citizens, the MLB airport traffic control tower (ATCT), and MAA, a series of recommended operational, land use, and administrative measures were identified. **Table 5-2** provides a summary of the NCP Sponsor Proposed Measures.



Source: ESA, 2016

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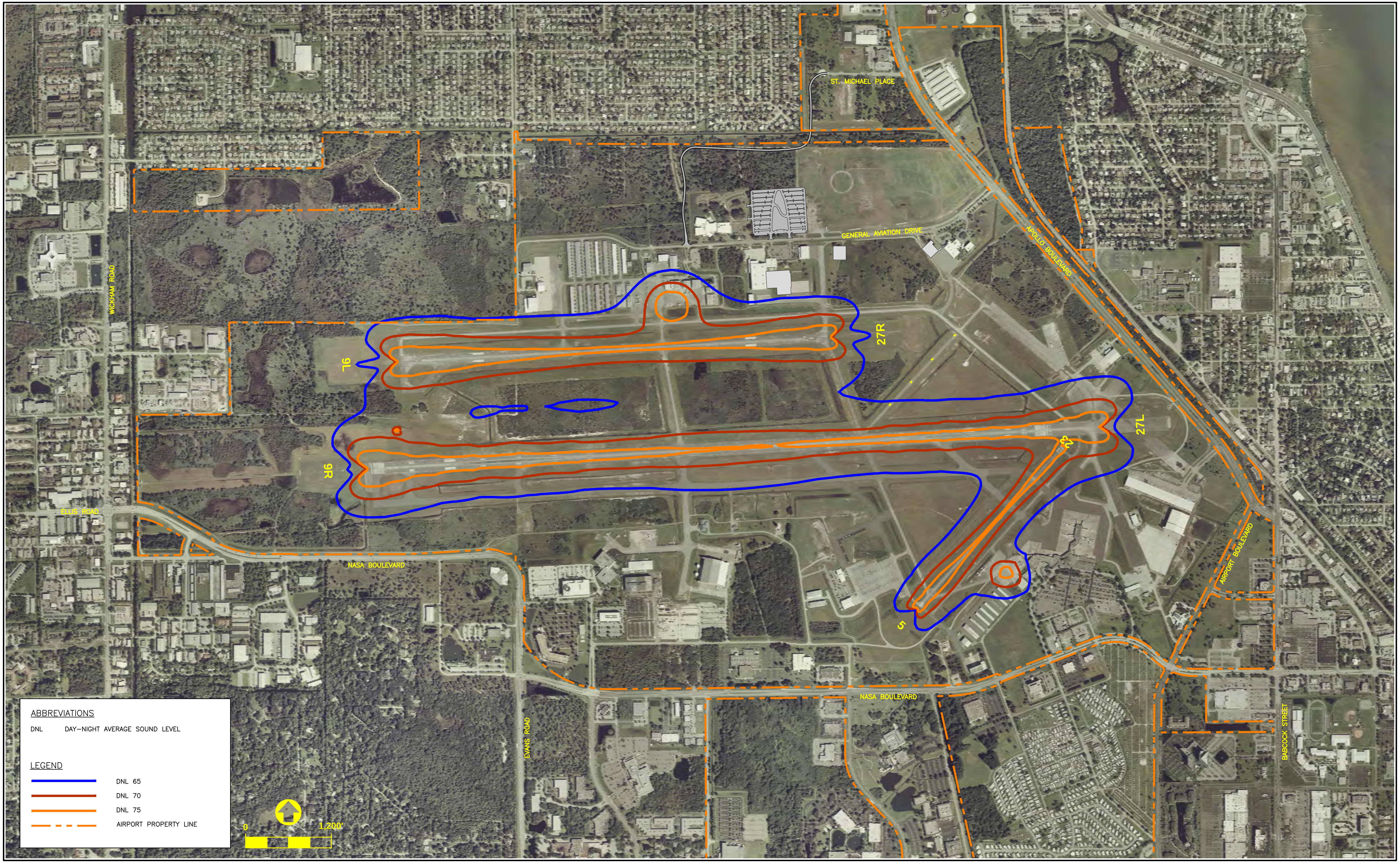
FIGURE 5-3

2016 DAY-NIGHT AVERAGE SOUND LEVEL (DNL) CONTOURS



Source: ESA, 2016

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FIGURE 5-4

2021 DAY-NIGHT AVERAGE SOUND LEVEL (DNL) CONTOURS

TABLE 5-2
THE NOISE COMPATIBILITY PROGRAM RECOMMENDED MEASURES AND BENEFITS

Noise Compatibility Program Measure	Benefit of Implementation
National Business Aviation Association (NBAA) Recommended Noise Abatement Procedures Promote the use of the NBAA close-in departure procedure.	Limits noise exposure to communities and reduces potential for annoyance resulting from aircraft operations.
Aircraft Owners and Pilots Association (AOPA) Recommended Noise Abatement Procedures Promote the use of the noise abatement procedures recommended by the AOPA.	Limits noise exposure to communities and reduces potential for annoyance resulting from aircraft operations.
Noise Compatibility Program Management Recommended the Airport manage the implementation of the Noise Compatibility Program.	Ensures timely implementation of program measures.
Community Involvement Recommended that the MAA continues accepting noise complaints via phone and email as well as create a webpage on noise abatement programs at MLB.	Opens communication with the public and provides forum to provide information and receive public feedback.
Airport Noise Abatement Signage Recommends that the MAA purchase and installs noise abatement reminder signs at the ends of each runway.	Enhances pilot-awareness of noise-sensitive areas, improves voluntary noise abatement procedure compliance, and reduces potential for annoyance resulting from aircraft operations.
Develop Jeppesen-style Insert on Noise Abatement Programs at MLB Recommended that the MAA voluntarily work with MLB ATCT, flight schools, and the FAA to publish Jeppesen-style pilot handouts notifying pilots of the noise abatement measures at MLB.	Educates pilots regarding local noise concerns and reduces potential for annoyance resulting from aircraft operations.
Noise Program Update Recommended that MAA staff should continue to routinely examine operating characteristics of MAA to determine if significant changes have occurred that would require an update to the Noise Exposure Maps.	Prevents potential for future non-compatible land use through recurring NEM updates.
ILS training to Runway 9R begin turn ½ to 1 mile before runway to a 220° heading Recommended for VFR training aircraft weighing less than 12,500 lbs.	Keeps VFR training aircraft separated from other training aircraft utilizing Runway 5 and 9L training patterns.
Runway 9L-27R training follow a modified Wickham Rd. pattern Recommended for training aircraft performing touch and go operations occurring on Runway 9L-27R to fly a slightly wider pattern.	Avoids overflight of and limits noise exposure to residential communities.
Propeller aircraft departing 27L climb to runway end before turning Recommended for 27L departures that usually turn before the runway end and directly overfly residential communities southwest of the airport at lower altitudes.	Limits noise exposure to communities and reduces potential for annoyance resulting from aircraft operations.
Noise Barrier for engine run-ups Recommended to build a barrier between Runways 27L and 27R due to its central location on the airport.	To reduce the noise impacts from engine maintenance run-ups.
Nighttime engine run-ups restricted between 9:00 p.m. and 7:00 a.m. Engine run-ups would continue to be restricted during nighttime hours.	To reduce the noise impacts from engine maintenance run-ups.

SOURCE: Orlando Melbourne International Airport 14 CFR Part 150 Study (2016).

5.9 Water Resources

Environmental surveys, analyses, and other available information were reviewed in order to determine the potential floodplains and other surface water impacts the proposed airport improvement projects could have on water resources. In addition, the most recent FLUCCS data was obtained from SJRWMD to identify the approximate wetlands and other surface water areas on the airfield.

5.9.1 Wetlands and Waterways

The United States Army Corps of Engineers (USACE) has authority to regulate activities in Waters of the United States under the *Clean Water Act of 1972*, as amended. Wetlands are a sub-set of Waters of the U.S. The USACE uses three characteristics of wetlands when making wetland determinations: vegetation, soil, and hydrology. Freshwater wetlands are federally regulated by the EPA under Section 404 of the Clean Water Act. Executive Order 11990, *Protection of Wetlands*, and Order DOT 5660.1A, *Preservation of Wetlands*, set the standard for a federal agency action involving wetlands and set forth policy for transportation projects, including airports. Wetlands, unless there is no practicable alternative, should be avoided. If it is not possible to avoid impacting a wetland then NEPA review must be conducted, through either an EA or Environmental Impact Statement (EIS).

MLB is located approximately 0.6 miles west of the Indian River. This 120-mile long, north-south river is part of a brackish lagoon (the Indian River Lagoon water system) located on the east coast of central Florida. Approximately two miles northeast of MLB is the Eau Gallie River, approximately six miles west-northwest is Lake Washington and the St. Johns River, and approximately two miles southeast is Crane Creek. The airport and its surrounding area contain a network of ditches and drainage canals. A review of EPA database reveals there are no impaired streams or water bodies located on or adjacent to MLB. The airport operates under stormwater management permits and implements pollution prevention plans and best management practices.

Several different wetland areas have been mapped on-airport property. While several have been field delineated in the past using both SJRWMD and USACE criteria, those shown in Figure 5-1 are based on the 6000 series FLUCCS codes. The non-jurisdictional 5000 series FLUCCS codes were also reviewed, but not included as part of Figure 5-1. Development sites should be evaluated early in the project development process to determine the presence of any Waters of the U.S. or wetlands, and to determine permitting needs and potential mitigation measures. Proposed development projects will seek to avoid and minimize wetland impacts. If impacts are unavoidable, these impacts would be analyzed through a NEPA analysis and mitigated (e.g., through wetland mitigation bank credits) accordingly.

5.9.2 Floodplains

Executive Order 11988, "Floodplain Management,"[6] directs federal agencies "to take actions to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by the flood plains."[7] Department of Transportation Order 5650.2, *Floodplain Management and Protection*, and FAA Orders 1050.1F and 5050.4B contain policies and procedures for implementing the Executive Order and evaluating potential floodplain impacts. Agencies are required to make a finding that there is no practicable alternative before taking action that would encroach on a floodplain based on a 100-year flood (7 CFR 650.25).

The Federal Emergency Management Agency (FEMA) identifies flood hazard areas that are depicted on Flood Insurance Rate Maps (FIRMs). A floodplain is defined as the lowlands and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, at a minimum, that are prone to the 100-year flood. The 100-year floodplain is considered the base floodplain. Flood hazard areas identified on FIRMs are defined as Special Flood Hazard Area, which are assigned with various zone designations signifying their individual characteristics. Zone A is subject to inundation by the one percent annual chance flood event. Zone B is a moderate flood hazard areas, and are areas between the limits of the base flood and the 0.2 percent annual chance (or 500-Year) flood.[8] While there are some Zone A floodplains located on-airport property (see Figure 5-1), these are limited to the out-parcel located northwest of the airfield. There are no Zone B floodplains located in the vicinity of the airport.

5.10 Construction Impacts

Construction impacts are generally short-term in nature and would vary depending on which projects are implemented. The construction required for any improvement or proposed developments could have the potential to impact air quality, surface transportation, water quality, and noise through the use of heavy equipment and vehicle trips generated from construction workers traveling to and from the project sites. For water quality, each project will have to adhere to the applicable Stormwater Pollution Prevention Plan (SWPPP) of the airport. For those where construction could take place in proximity to residential areas; this construction would be subject to local noise ordinances. Major roadways border MLB; therefore, construction traffic would likely avoid residential areas. Construction impacts would be evaluated as part of any NEPA analysis required, prior to constructing any of the proposed development projects.

6 *Executive Order 11988*, "Floodplain Management", May 24, 1977 (42 FR 26951).

7 FAA Order 1050.1F, Appendix A Section 9 9.1.

8 Flood Insurance Rate Map, Orange County Florida and incorporated Areas. Map Number 12095C0445F, Panels 445 (revised September 25, 2009) and Map Number 12095C0435F, Panels 435 (revised September 25, 2009).

5.11 Types of Environmental Reviews

5.11.1 Federal Reviews

Processing Airport Improvement Program grant applications and Airport Layout Plan (ALP) approvals are “federal actions” commonly undertaken by the FAA in support of an airport development project. These federal actions require environmental review under NEPA. Airport development projects also require compliance with other federal environmental laws (e.g., *Endangered Species Act*) and state and local environmental regulations.

Most airport development projects require FAA’s “unconditional” environmental approval of the portion of the ALP depicting the proposed project. *This ALP approval requires NEPA review, whether FAA funding is involved or not.*

To avoid project delays, MLB staff should consult with the FAA and FDOT early in the planning stages of a development project to determine the appropriate level of environmental review and documentation.

For those projects that require environmental review under NEPA, the three types of documentation that may be used are summarized in **Table 5-3**. Categorical Exclusions and Environmental Assessments are usually prepared by the Airport Sponsor and, if the documentation meets FAA requirements, they are accepted by the FAA and become federal documents. Environmental Impact Statements are prepared by the FAA. The development projects recommended in this Master Plan update would be subject to the appropriate level of environmental review at such time that a specific project is proposed for implementation.

TABLE 5-3
TYPES OF FAA NEPA REVIEW DOCUMENTATION

CATEX **Categorical Exclusion**	The FAA has identified certain actions that may be categorically excluded from a more detailed environmental review. However, extraordinary circumstances, such as wetland impacts, may preclude Categorical Exclusion (CATEX). A CATEX requires a review of impacts and completion of forms provided by the FAA. In some cases, documentation and agency coordination may be necessary to address extraordinary circumstances (see FAA ARP SOP No. 5.00). CATEXs that may apply to future airport development projects at MLB are summarized below (emphasis added). See FAA Orders 1050.1F and 5050.4B for a more detailed description of these and other categorically excluded actions that may apply to development projects at MLB. 1. Access and service road construction that does not reduce the level of service on local traffic systems below acceptable levels. 2. Construction, repair, reconstruction, resurfacing, extending, strengthening, or widening of a taxiway, apron, loading ramp, or runway safety area; or the reconstruction, resurfacing, extension, strengthening, or widening of an existing runway – *provided the action would not result in significant erosion or sedimentation and will not result in a significant noise increase over noise sensitive areas or result in significant impacts on air quality*. 3. Construction or limited expansion of accessory on-site structures, including storage buildings, garages, hangars, T-hangars, small parking areas, signs, fences, and other essentially similar minor development items. 4. Construction or expansion of facilities – such as terminal passenger handling and parking facilities or cargo buildings, or facilities for non-aeronautical uses that *do not substantially expand those facilities*. 5. Demolition and removal of FAA or non-FAA on-airport buildings and structures, *provided no hazardous substances or contaminated equipment are present on the site of the existing facility*. Does not apply to historic structures. 6. Placing fill into previously excavated land with material compatible with the natural features of the site, *provided the land is not delineated as a wetland*; or minor dredging or filling of wetlands or navigable waters for any categorically excluded action, *provided the fill is of material compatible with the natural features of the site and the dredging and filling qualifies for an U.S. Army Corps of Engineers nationwide or a regional general permit*. 7. Grading of land, removal of obstructions to air navigation, or erosion control measures, *provided those activities occur on and only affect airport property*. 8. Topping or trimming trees to meet 14 CFR Part 77 standards for removing obstructions which can adversely affect navigable airspace.
EA **Environmental Assessment**	An Environmental Assessment (EA) is prepared for proposed actions with expected minor or uncertain environmental impact potential. An EA requires analysis and documentation similar to that of an EIS, but with somewhat less detail and coordination. The FAA will review the EA and decide to either issue a Finding of No Significant Impact (FONSI) or prepare an Environmental Impact Statement (EIS). Future airport development projects and actions at MLB that may require an EA are summarized below (emphasis added). See FAA Orders 1050.1F and 5050.4B for more information. 1. Runway extensions due to possible wetland impacts, potential off-airport impacts related to aircraft noise, and potential impacts to affect listed species habitat. 2. Taxiway construction due to possible wetland impacts and potential to affect listed species habitat. 3. Aircraft parking apron; hangar and structures; and/or access road projects that may not qualify for a CATEX due to extraordinary circumstances (e.g., wetland impacts may not qualify for a nationwide or regional general permit). 4. Approval of operations specifications or amendments that may significantly change the character of the operational environment of an airport. 5. New air traffic control procedures (e.g., instrument approach procedures, departure procedures, enroute procedures) and modifications to currently approved procedures that routinely route aircraft over noise sensitive areas at less than 3,000 feet above ground level.
EIS **Environmental Impact Statement**	An EIS is prepared for major federal actions, which are expected or known to significantly affecting the quality of the human environment. At this time, no future airport development projects at MLB are expected to require the preparation of an EIS.

Compiled by ESA, 2016.

5.11.2 State Reviews

FDOT's *Project Development and Environmental Manual* provides guidance for the evaluation of environmental impacts for airport development projects at MLB that are 100 percent state funded and roadway projects that may be state, local, or privately-funded.[9] The FDOT *2016 Guidebook for Airport Master Planning* notes that for the purposes of an airport master plan and the development of airport alternatives, it is not necessary to document environmental considerations to the extent identified in the Project Development and Environmental (PD&E) Manual. However, environmental conditions should be considered in master plans as a precursor to any subsequent FDOT environmental requirements.

FDOT projects are subject to federal, state, county, and local environmental regulations. Although an airport development project at MLB may be funded entirely by FDOT, or more likely a combination of FDOT and MAA funds, "federal actions" necessary to implement the project requires an environmental review under NEPA. As noted previously, most airport development projects, regardless of funding, require FAA's unconditional approval of the portion of the ALP that depicts the proposed project. For this reason, a majority of development project at airports, including MLB, are subject to review under NEPA.[10] In cases where FDOT environmental review is appropriate, one of the types of documentation identified in **Table 5-4** would likely be required.

TABLE 5-4
TYPES OF FDOT ENVIRONMENTAL REVIEW DOCUMENTATION

NMSA **Non-Major State Action Checklist**	The Non-Major State Action (NMSA) Checklist is only required when FDOT is the lead agency and the project does not require a PD&E Study. The checklist evaluates potential impacts and helps determine if additional evaluation is necessary or if a State Environmental Impact Report (SEIR) should be prepared.
SEIR **State Environmental Impact Report**	Required for non-federal transportation projects that require screening through the FDOT Environmental Screening Tool (EST). The SEIR form documents the social and economic, cultural, natural, and physical categories evaluated as part of the project. Additional information for each category is included in attachments, as needed.
Projects without FDOT Involvement	Used when FDOT is not the lead agency; however, compliance with federal, state, and local regulations is still required. Generally follows SEIR procedures.

Compiled by ESA, 2016.

The expected type of environmental review for the selected airport development projects is included in the airport development program.

9 *Project Development and Environmental Manual*. Part 1, Chapter 10. Florida Department of Transportation. August 18, 2016.

10 Most ALPs are "conditionally approved" by the FAA. Conditional approval shows that: 1) the ALP depicts features that are safe and efficient for airport operations and airport use, 2) the FAA has not yet completed its NEPA environmental review, primarily because future development projects are not yet needed and are not ready for decision, and 3) the FAA has not authorized the airport sponsor or project proponent to begin building the facilities shown on the conditionally approved ALP. The sponsor or proponent may start building facilities only after the FAA completes its environmental review and issues an "unconditional approval of the ALP depicting those facilities.

CHAPTER 6

Alternatives for Airport Development

CHAPTER 6
Alternatives for Airport Development

6.1 Introduction

This chapter evaluates potential improvements to provide the facility requirements identified for the Orlando Melbourne International Airport (MLB) over the 20-year planning period. The identification and evaluation of development concepts and subsequent recommended alternatives were facilitated through meetings and discussions with airport users and tenants, airport management, Melbourne Airport Authority (MAA), and local government agencies. A public workshop was conducted on August 8, 2016 to allow airport users, members of the community, and local government representatives the opportunity to review the conceptual development alternatives and provide comments.

While a number of projects to maintain and improve the airport will be conducted in the future, only the most significant are presented in this chapter. These improvements, most of which have the potential to impact existing facilities, the environment, or surrounding community, are categorized as follows:

- Runway Improvements
- Taxiways System Improvements
- Passenger Terminal Area Facilities
- Sites Available for Aviation Related Uses
- Concepts for Future Airport Facilities
- Non-Aviation Related Development

The primary intent of the alternatives analysis is to evaluate the viability of meeting the identified needs and how best to undertake the selected improvements. As such, the evaluations include factors related to the operational effects, potential environmental impacts, cost considerations, and implementation issues. While there are inherent difficulties in expressing certain factors in comparable terms, at minimum, each development option must meet the applicable Federal Aviation Administration (FAA) and Florida Department of Transportation (FDOT) standards for safety.

6.2 Airfield Constraints Analysis

An analysis of the operational, physical, and environmental constraints of the airfield was made prior to defining any airport alternatives. This effort ensured that the development strategy for the airport considered factors that could impact project feasibility, the community, the environment, and the long-term viability of the airport. Among the constraints considered, airfield design standards, surfaces, and setbacks associated with safety were of utmost importance. **Figure 6-1** reflects these, as well as other features which may affect development options, including wetland boundaries, flood zones, and areas optioned to existing airport tenants.

6.2.1 Airspace Surfaces

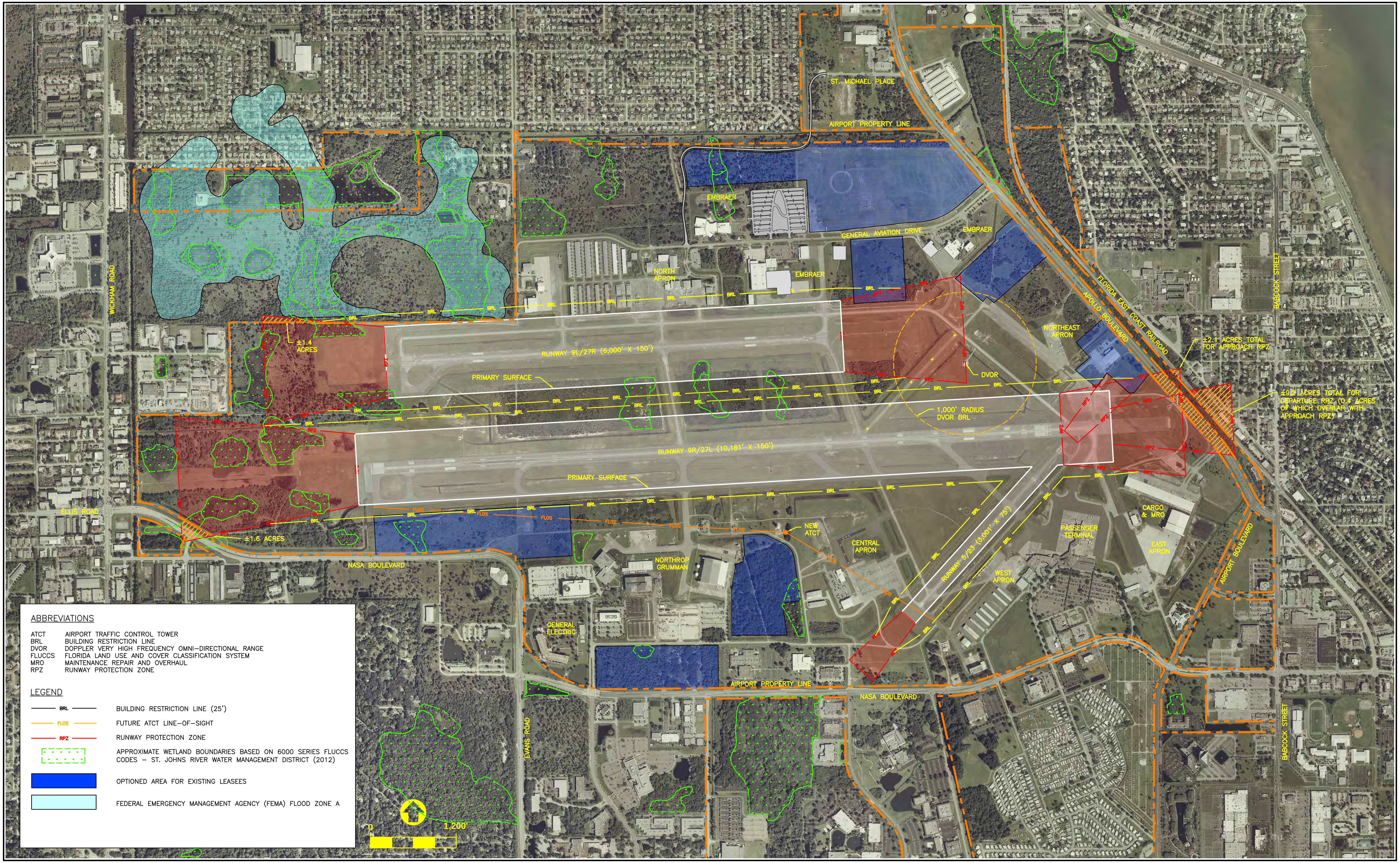
Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* defines airspace surfaces for the purpose of identifying obstructions at or in the vicinity of an airport. Some obstructions may be considered a hazard to air navigation. Figure 6-1 depicts the Primary Surface associated with each of MLB's three runways. The rectangular Primary Surfaces follow the same elevation as the elevation of the nearest point of the respective runway centerline. Because the Primary Surfaces at MLB are essentially at ground level, only those objects essential to air navigation or the movement of aircraft should be located within the Primary Surfaces. The Primary Surfaces also encompass the Runway Safety Areas (RSA) and Runway Object Free Areas (ROFA) associated with each runway. The Primary Surfaces shown on Figure 6-1 are based on the existing runway configuration. The extent and size of a Primary Surface would change if the runway endpoints or types of instrument approach procedures are different in the future.

Fixed and moveable objects are also considered obstructions if they penetrate any of the Approach or Transitional Surfaces that extend upward and outward from each Primary Surface. However, these surfaces are not shown as they vary in height depending on their proximity to the Primary Surface. In lieu of depicting the different airspace surfaces, a Building Restriction Line (BRL) is shown which delineates where structures approximately 25 feet in height could be located in the vicinity of the runways and not penetrate the 14 CFR Part 77 surfaces. The BRL typically follows the Transitional Surface with the same limiting elevation, when there are no other more restrictive imaginary surfaces. While it is possible to plan and construct facilities inside the 25 foot BRL (such as shorter T-hangar, maintenance facility, or airfield lighting vault type structures), this line defines areas that are not suitable for taller structures and even parking aprons for aircraft with tail heights greater than 25 feet.

6.2.2 ATCT Line-of-Sight

The existing and planned MLB airport traffic control tower (ATCT) line-of-sight must be considered so that the controllers have an unobstructed view of all aircraft movement areas. The line-of-sight lines depicted on Figure 6-1 are the most critical based on the new ATCT site and the existing airfield configuration. The evaluation of conceptual development alternatives will consider how the line-of-sight limits may shift in response to potential airfield changes or if line-of-sight would be obstructed by proposed development. Effects on ATCT line-of-sight were based on the established "eye height" for the new ATCT location, which is 133 feet above mean sea level.

FIGURE 6-1
PRIMARY AIRFIELD CONSTRAINTS



Source: ESA, 2016

6.2.3 Runway Protection Zones

Existing Runway Protection Zones (RPZ) at MLB are shown on Figure 6-1 while the current FAA interim guidance on land use compatibility within their limits is address in a following section. For the purpose of identifying constraints, new development within an existing or future RPZ was not considered compatible with airport operations. As with the 14 CFR Part 77 surfaces discussed above, the location and dimensions of an RPZ could change if the runway endpoints or types of instrument approach procedures change.

6.2.4 Wetlands and Floodplains

Wetlands and floodplains depicted on Figure 6-1 were identified as environmental constraints based on these resources having regulatory protection. In particular, modification to wetlands requires federal and state permits. The wetland permit process requires the applicant to first demonstrate avoidance and minimization of impact. After these two steps have been satisfied, mitigation is required to off-set the unavoidable impacts. Similarly, floodplain impacts require state permit and compliance with local flood protection ordinances.

6.2.5 Optioned Airport Land

Land available for future development at MLB requires the identification of those undeveloped areas that have been leased or optioned to existing airport tenants for future expansion of their facilities. Discussions with Airport Management identified these areas, which are depicted on Figure 6-1.

6.2.6 Physical (Built Environment) Constraints

The evaluation of constraints also included the airport's physical setting within an urban, built-up environment. The identification of possible airport development alternatives considered, in general terms, the potential complexity, cost, and social impacts of acquiring land, relocating residences and businesses, and moving roads.

As shown on Figure 6-1, MLB's airfield is bounded by a large residential area to the north; NASA Boulevard and light industrial, office space, health care, and residential development to the south; Apollo Boulevard, the Florida East Coast (FEC) Railroad, Airport Boulevard, and commercial and residential development to the east; and Wickham Road and commercial and light industrial development to the west. NASA Boulevard, Apollo Boulevard, Airport Boulevard, and Wickham Road are all multi-lane arterial roads. The initial findings of the constraints analysis indicated that the potential costs and impacts related to a relocation or realignment of these roads – and associated business and residential relocations – would only be justified under extraordinary circumstances and that the identification of alternatives would first evaluate meeting future development needs on existing airport property or vacant adjoining property.

MLB and land surrounding the airport is generally flat and contains a network of ditches and drainage canals. Substantial impacts or modifications to the existing MLB stormwater management

system and/or issues related to long-term management of stormwater at each potential development site was also viewed as a constraint for the analysis of alternatives.

6.3 Runway Improvements

An increase in the useable length of Runway 9R/27L and Runway 9L/27R was identified in the facility requirements chapter. While extensions to both parallel runways have been reflected on past Airport Layout Plan (ALP) drawings, an evaluation of the options for providing additional runway length was conducted in light of current conditions and the factors and conclusions outlined in the updated aviation activity forecast.

6.3.1 Critical Issues Related to Runway Improvements

The following sections describe the most critical issues related to planning the ultimate layout of Runway 9R/27L and Runway 9L/27R. These include an overview of the change to the FAA guidance on RPZs, improvements made to the instrument approach procedures for MLB since the 2004 Master Plan, and other key design considerations.

6.3.1.1 Change in Guidance for Runway Protection Zones

In September 2012, the FAA issued the *Interim Guidance on Land Uses Within a Runway Protection Zone*. Under this newer guidance, certain land uses within the limits of a new or modified RPZ will need to be coordinated and a determination made by the FAA as to whether or not the land use is compatible. The facility requirements chapter documented that only the areas encompassed by the RPZs off each end of Runway 5/23 and Runway 27R are within the limits of airport property. As illustrated in Figure 6-1, a small portion of the other existing RPZs extend off-airport property, and have done so before the interim RPZ guidance was issued in 2012. However, since the interim policy will apply to any changes in the size or location of these existing RPZs, this must be considered as part of any proposed extension to Runway 9R/27L or Runway 9L/27R. For the portion of the existing RPZs extending beyond the current airport property boundary, the interim guidance states that the FAA will continue to work to remove or mitigate any incompatible land uses as practical.

6.3.1.2 Existing Approach Procedures with Vertical Guidance

The limitations to any published instrument approach are based on very detailed airspace analyses using FAA Order 8260.3B, *United States Standard for Terminal Instrument Procedures (TERPS)*. However, no such documentation could be found associated with the establishment of the LPV approaches (localizer performance with vertical guidance) published for Runway 9L/27R, which use precision area navigation (RNAV) procedures based on Global Positioning Satellites (GPS).[1] As such, the FAA Orlando Airports District Office (ADO) provided the opportunity to conduct an updated TERPS analysis using the Airport Geographic Information System (AGIS) data obtained as part of this Master Plan update and information on newer facilities being constructed on the airfield. This TERPS analysis, which was performed by the FAA in April of 2016, was only

1 The fact that documentation was not available for review in this Master Plan does not imply that the required analyses were not performed when the Instrument Approach Procedure was developed.

conducted for the LPV RNAV/GPS approaches to Runway 9L/27R since the similar approaches to the primary runway were within the surfaces related to the Runway 9R precision approach.

In the April 2016 analysis, the FAA identified two objects that would penetrate the 40:1 departure surface criteria off the end of Runway 9L. However, there are no takeoff minimums or departure route descriptions included with the most current U.S. Terminal Procedures Publication for either end of Runway 9L/27R. In other words, this runway has never been designated as an instrument departure runway and therefore does not require the 40:1 departure surface. Additionally, the two penetrations identified were associated with the distance measuring equipment and monitoring antennae installed as part of the new Doppler Very High Frequency Omni-Directional Range (DVOR). The data for these two antennae was based on the construction plans rather than the final surveyed heights as the DVOR was still being installed at the time of the TERPS analysis.

What the newer AGIS data and FAA analysis did reveal is that there are a number of penetrations to the 14 CFR Part 77 surfaces associated with the existing LPV RNAV/GPS approaches to Runway 9L/27R. These will be identified on the appropriate sheets of the ALP drawing set as required for both existing and future conditions. It should be noted that while many are vegetative obstructions, there are a few power poles, some portions of the airport perimeter fencing, and portions of 11 hangars on the north side of Runway 9L/27R. Because these 14 CFR Part 77 penetrations do not impact the Runway 9L/27R instrument approach minimums, obstruction lighting is recommended for the hangars and any other fixed object that cannot be removed or relocated.

6.3.1.3 Runway End Siting

While there are many design elements to consider when establishing the future ends of a runway, only the most significant are included in this section. When possible, the approach and departure thresholds should be collocated with the physical runway ends. As such, the required airport design approach and departure surfaces to these thresholds are a major consideration in determining the runway ends. It should be noted that the approach surfaces for this purpose are those defined in FAA Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design*, which are not the same as those defined in 14 CFR Part 77. Regardless, these surfaces (which are categorized by a Runway Type number) still need to be clear of obstacles and due to their size, extend well beyond the limits of the airport property boundary. Conversely, for any runway improvements, both the RSA and ROFA must be on-airport property in order to meet the respective FAA airport design standards related to safety of aircraft, pilots, and passengers.

6.3.2 Primary Instrument Runway 9R/27L

An ultimate length of up to 11,600 feet was recommended in the facility requirements chapter for Runway 9R/27L to support the largest international charter and air cargo aircraft expected to operate at MLB during the planning period. While the aircraft justifying this length do not presently conduct more than 500 annual operations, the ability for the primary instrument runway to accommodate this activity in the future must be preserved.

6.3.2.1 Improvement Options to the East End of Runway 9R/27L

Two opportunities for increasing the useable length of Runway 9R/27L to the east are illustrated in **Figure 6-2**.

Remove 699 Foot Displaced Threshold

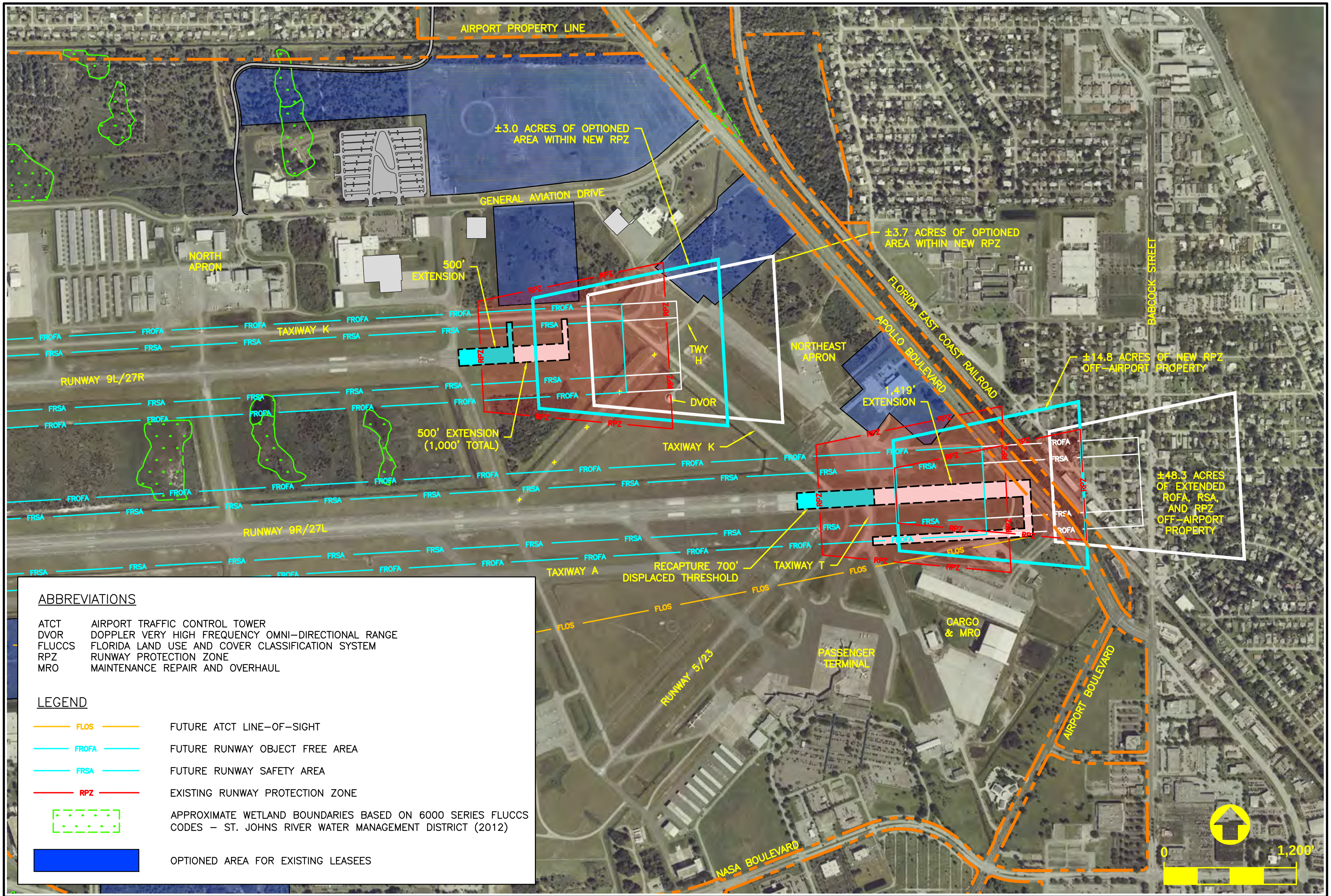
Presently, the first 699 feet of pavement on the Runway 27L end is marked as a displaced threshold and not available for landings. Removing this displaced threshold would provide 10,181 feet for takeoffs and landings in both directions, thus eliminating the need for declared distances on Runway 9R/27L and the separate Approach and Departure RPZs on the east end. The standard RSA and ROFA surfaces, both of which are on-airport property, would be maintained under this scenario. However, the new single RPZ would encompass approximately 14.8 acres of off-airport property. This area encompasses a section of Apollo Boulevard, a section of the FEC Railroad, commercial property, and residences. Conversely, the new single RPZ would impact slightly less land that is optioned to an existing tenant than the current Approach RPZ.

Under the FAA's interim guidance for land use compatibility within RPZs, removal of the displaced threshold will require consultation with the FAA in regard to land use compatibility. This consultation will include a specialized analysis of alternatives that would evaluate land uses in the new RPZ area, measures that may minimize the impact of those land uses in the RPZ, and mitigating any risk to people and property on the ground.

Extend Runway 9R/27L East 1,419 Feet

A 1,419 foot extension to the east of the current Runway 9R/27L pavement could occur as a second phase to removing the 699 foot displaced threshold or both improvements could be accomplished under one project. In either scenario, the additional 1,419 foot extension would provide 11,600 feet of useable runway for takeoffs and landings in both directions. At a minimum, this extension would also require an extension of the taxiway system to the new Runway 27L threshold and the relocation of the Instrument Landing System (ILS) localizer antenna on this end of the runway.

As shown on Figure 6-2, the new RPZ associated with this extension would encompass approximately 48.3 acres of off-airport property, with the associated RSA and ROFA extending out to Babcock Street. As such, this would require consultation with the FAA due to the substantial impact on the community and neighborhoods located east of MLB.



ABBREVIATIONS

ATCT	AIRPORT TRAFFIC CONTROL TOWER
DVOR	DOPPLER VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE
FLUCCS	FLORIDA LAND USE AND COVER CLASSIFICATION SYSTEM
RPZ	RUNWAY PROTECTION ZONE
MRO	MAINTENANCE REPAIR AND OVERHAUL

LEGEND

FLOS	FUTURE ATCT LINE-OF-SIGHT
FROFA	FUTURE RUNWAY OBJECT FREE AREA
FRSA	FUTURE RUNWAY SAFETY AREA
RPZ	EXISTING RUNWAY PROTECTION ZONE
	APPROXIMATE WETLAND BOUNDARIES BASED ON 6000 SERIES FLUCCS CODES – ST. JOHNS RIVER WATER MANAGEMENT DISTRICT (2012)
	OPTIONED AREA FOR EXISTING LEASEES

Source: ESA, 2016.

FIGURE 6-2
RUNWAY EXTENSION OPTIONS TO THE EAST

6.3.2.2 Improvement Options to the West End of Runway 9R/27L

Two possibilities for increasing the useable length of Runway 9R/27L to the west are illustrated in **Figure 6-3**.

Extend Runway 9R/27L West 500 Feet

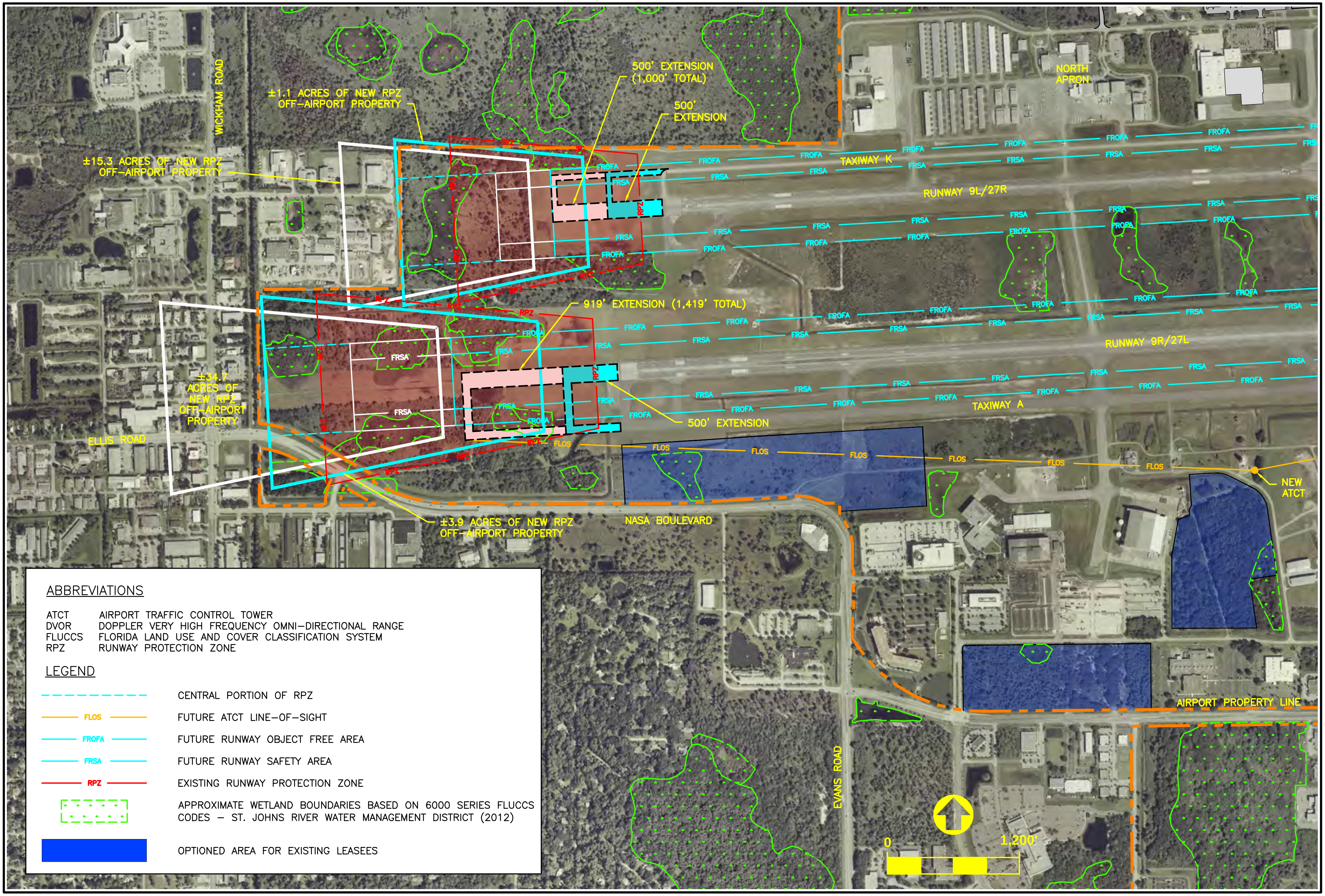
Extending Runway 9R/27L to the west by 500 feet would provide 10,681 feet of useable runway length for takeoffs in both directions; 10,681 feet for landings on Runway 9R; and 9,981 feet for landings on Runway 27L (due to the 699 foot displaced threshold). While the runway extension, extended RSA, extended ROFA, and extension of parallel Taxiway A would all be within the existing airport property limits, approximately 3.9 acres of the southwest corner of the new RPZ would extend off-airport property. As is currently the case, this would encompass a small portion of NASA Boulevard which would require consultation with the FAA based on their interim RPZ guidance.

The 500 foot extension would require the relocation of the Runway 9R ILS, which would include the on-airport glideslope antennae and Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR). It might also require the relocation of the off-airport marker beacons associated with the ILS approach course. There would be direct impacts to wetland areas (approximately 4.3 acres total), some indirect wetland impacts associated with the clearing of trees in wetland areas for the 14 CFR Part 77 surfaces, modifications required to existing airport drainage ditches, and consideration needed for the areas which contain habitat potentially suitable for the scrub jay.

Extend Runway 9R/27L West 1,419 Feet

A 1,419 foot extension to the west of the current Runway 9R/27L pavement could occur as a second phase (additional extension of 919 feet) to the 500 foot extension described above or both improvements could be accomplished under one project. In either scenario, this improvement would provide 11,600 feet of useable runway for takeoffs in both directions; 11,600 feet for landings on Runway 9R; and 10,901 feet for landings on Runway 27L (due to the 699 foot displaced threshold). While the runway extension, the extended RSA, extended ROFA, and extension of parallel Taxiway A would all be within the existing airport property limits, approximately 34.7 acres of the new RPZ would extend off-airport property. As such, this will require consultation with the FAA in regard to land use compatibility within the RPZ.

The extension would require the relocation of the Runway 9R ILS, which would include the on-airport glideslope antennae and MALSR system. It would also require the relocation of the off-airport marker beacons associated with the ILS approach course. There would be direct impacts to wetland areas (approximately 9.9 acres total), some indirect wetland impacts associated with the clearing of trees in wetland areas for the 14 CFR Part 77 surfaces, modifications required to existing airport drainage ditches, and consideration needed for the areas which contain habitat potentially suitable for the scrub jay.



Source: ESA, 2016.

FIGURE 6-3
RUNWAY EXTENSION OPTIONS TO THE WEST

6.3.2.3 Evaluation of Options for Runway 9R/27L

The following summarizes why the potential improvement options evaluated were not selected to increase the useable length of Runway 9R/27L.

Remove 699 Foot Displaced Threshold (Not Recommended)

While it is possible to meet the proper runway end siting criteria to remove the 699 foot displaced threshold on the east end of Runway 9R/27L, doing so significantly increases the RPZ area that extends off-airport property. Figure 6-2 shows that the 14.8 acres of off-airport RPZ under this option would include portions of Apollo Boulevard and the FEC Railroad. It would also encompass approximately eight commercial buildings, 11 private residences, and a number of vacant lots that do not have compatible zoning under the FAA's interim RPZ guidance. In fact, under the current guidance, any one of these impacts would require other alternatives to be considered that would avoid incompatible use, minimize the impact, or mitigate the associated risk. Therefore, it is not considered a feasible option to increase the useable runway length.

Extend Runway 9R/27L East 1,419 Feet (Not Recommended)

Since the first part of this option (removing the 699 foot displaced threshold) is not considered feasible due to community impacts, it stands to reason that an even greater impact is also not recommended. Extending Runway 9R/27L by 1,419 feet to the east would place nearly all of the new RPZ off-airport property, encompassing approximately 29 commercial buildings, 72 private residences, and a number of vacant lots with the potential for incompatible uses. Equally as critical, the full extension east would require the relocation of Apollo Boulevard, the FEC Railroad, and a significant amount of land acquisition and relocation services to offset the businesses and residents that would be impacted. Therefore, since this option would have such a significant impact on the community, it is not considered a feasible option to increase the useable runway length.

Extend Runway 9R/27L West 500 Feet (Not Recommended)

The potential to extend Runway 9R/27L west by 500 feet was explored since it would keep most of the new RPZ, the relocated ILS glideslope antennae, and relocated MALSR system on-airport property. However, it is possible the FAA might require a relocation of NASA Boulevard out of the new RPZ limits to meet the objectives of their interim RPZ guidance. In addition, the costs associated with relocating the ILS glideslope equipment, MALSR system, and potential environmental impacts are not considered feasible since the extension would not provide the useable runway length needed. Therefore, this improvement is not recommended.

Extend Runway 9R/27L West 1,419 Feet (Not Recommended)

While the 500 foot extension west was not considered feasible, the full extension of 1,419 feet west was still evaluated since it could provide the useable runway length recommended. However, this option significantly increases the adjacent roadways that would be encompassed by the new RPZ, to include both Wickham Road and Ellis Road in addition to NASA Boulevard. The new RPZ would also encompass approximately 37 commercial buildings and a few vacant lots that do not have compatible zoning under the FAA's interim RPZ guidance. When this is combined with the need to relocate the ILS glideslope equipment, MALSR system, and off-airport marker beacons, the proposed extension would require a significant amount of land acquisition and relocation

services to offset the facilities and businesses impacted. When all of these factors are taken into consideration, along with the overall wetland impacts associated with the full runway and taxiway system extension to the west, this improvement is not considered feasible.

6.3.2.4 Recommended Improvement for Runway 9R/27L

A derivative of the 1,419 foot extension of Runway 9R/27L to the west has been developed as the recommended alternative to meet the runway length requirements. The difference is that the full 1,419 feet of the proposed extension would be marked as a displaced threshold to Runway 9R. While this will impact how the overall extension would be utilized to provide additional runway length for takeoffs and landings, it creates the ability to balance the original impacts of the full extension with the actual operational requirements needed for the runway.

In the facility requirements chapter, the ultimate length of 11,600 feet is only required for the takeoff of the largest international charter and air cargo aircraft expected. If marked as a displaced threshold, the full 1,419 feet would be available for takeoffs in either direction of the runway while the existing threshold would remain in its present location for landings on Runway 9R. As stated in FAA AC 150/5300-13A, Change 1, a runway threshold can be located farther down a runway as a means for locating the RPZ to mitigate any unacceptable incompatible land uses. Doing so results in the need for separate Approach and Departure RPZs, as is currently the case on the east end of the runway with the 699 foot displacement of the Runway 27L threshold. It also requires the application of declared distances, which MLB currently has published based on the existing displaced threshold on the east end. In addition to takeoff lengths, the following section on declared distances also addresses the landing lengths available in each direction. As documented in the facility requirements chapter, a landing length of 8,500 feet is required for the largest international charter and air cargo aircraft expected.

Approach and Departure RPZs for a runway can vary significantly in size. For a displaced threshold on the west end of Runway 9R/27L, the Approach RPZ would be the same size (1,000 foot inner width, 1,750 foot outer width, and 2,500 feet long) and in the same location as the current single RPZ. Since the Runway 9R threshold would remain the same, there is no need to relocate the ILS glideslope equipment, MALSR system, or any off-airport marker beacons, as they would remain in their current locations. The Departure RPZ would be smaller with a 500 foot inner width, 1,010 foot outer width, and 1,700 feet long. Under the recommended alternative, the Departure RPZ could begin 200 feet west of the 1,419 foot extension to provide the additional runway length needed for takeoffs. However, approximately 2.2 acres of the new Departure RPZ would extend off-airport. While this would require coordination with the FAA with regard to their interim RPZ guidance, only an additional portion of NASA Boulevard lies within this area, as is currently the case with the existing single RPZ.

Taxiway A will also need to be extended 1,419 feet west to provide aircraft access to the future departure end of Runway 9R. As stated above, the Runway 9R threshold, as well as the existing Runway 27L displaced threshold would remain unchanged in the future. While it was mentioned that additional taxiway exits should be considered as part of the runway alternatives, none have been planned for the primary runway improvements. As documented during the runway and taxiway flow analysis, most of the smaller aircraft landing on Runway 9R exit at either Taxiway N

or Taxiway Q (just beyond the current optimal exit range). For the larger aircraft, while only Taxiway Q is within the future optimal exit range, most exit much further down the runway at Taxiways R or T since they typically access the passenger terminal; cargo; and maintenance, repair, and overhaul (MRO) apron areas at that end of the airfield. Therefore, the addition of another taxiway would not provide any real benefit to landing operations on Runway 9R. Almost an identical situation exists for landings on Runway 27L. The small aircraft have two exits within the current optimal range and while the larger aircraft only have one in the future optimal exit range, most continue their roll out to either Taxiways N or A. No consideration for a high speed taxiway was given since it was agreed the benefits would not likely justify the costs.

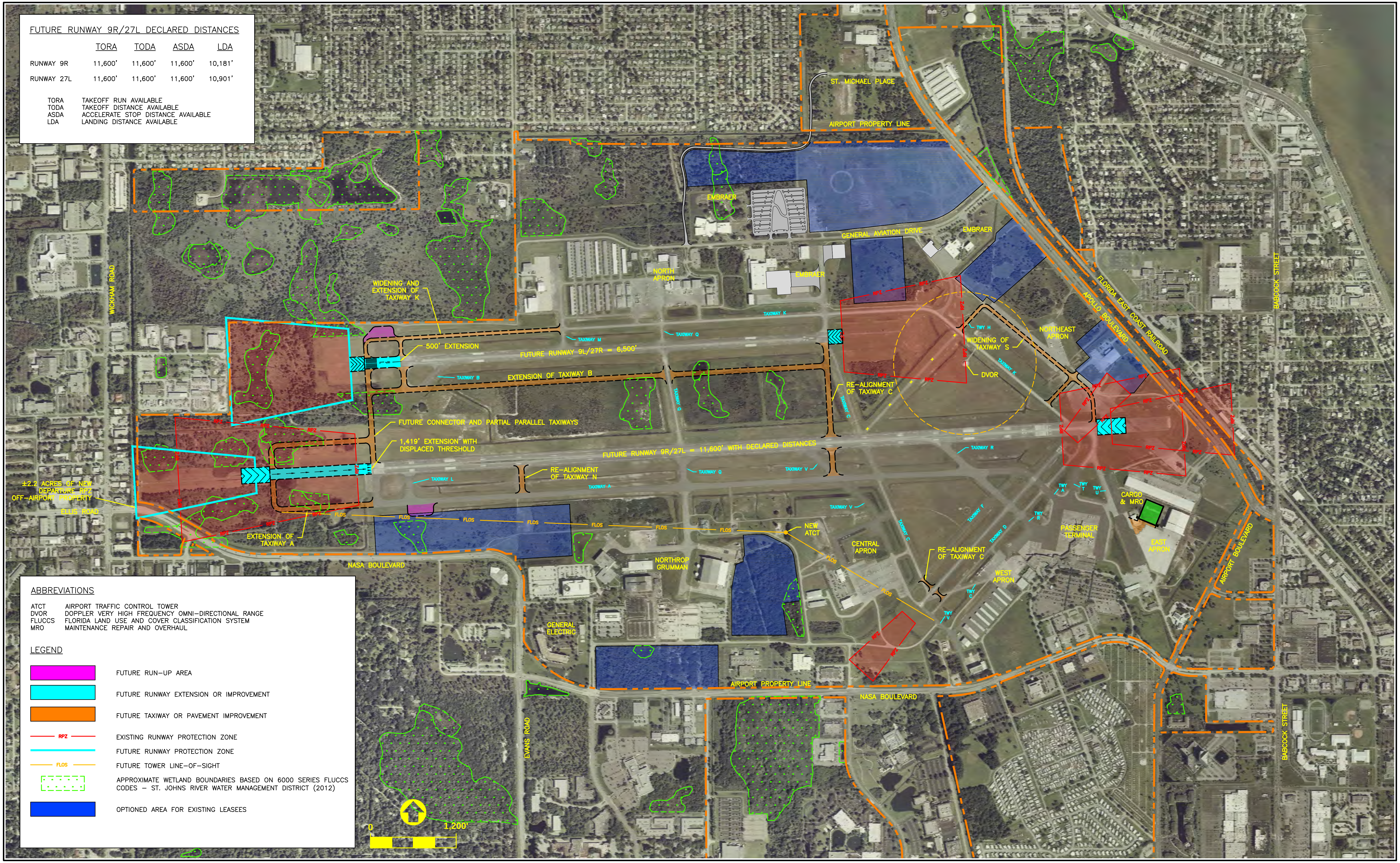
It should also be noted that like Taxiway R, Taxiway A currently provides direct access to Runway 5/23 from the passenger terminal apron. The solution to this direct access would be to eliminate the portion of Taxiway A between Taxiway D and the passenger terminal apron. However, according to air traffic control (ATC) management, this access point is almost exclusively utilized by the commercial passenger airlines accessing the passenger terminal apron. As noted in the runway and taxiway flow analysis, a RIM analysis was conducted at the FAA's request based on five incursions that had been documented at the intersection of Taxiway V and the Runway 5 threshold. No incursions have ever been documented for movements in the vicinity of Taxiway A and Runway 5/23. Eliminating the portion of Taxiway A between Taxiway D and the passenger terminal apron would eliminate the bypass capability for the larger aircraft operating to/from the passenger terminal apron, which is provided via Taxiways A and R. In addition, there are five visual cues at the Taxiway R and Runway 5/23 intersection for pilots, including elevated wig-wag lights. Therefore, the removal of this section is not considered feasible or required from a safety standpoint.

The recommended improvement to extend the primary instrument runway west by 1,419 feet with a displaced threshold to the existing Runway 9R end is shown on **Figure 6-4**.

Changes to Runway 9R/27L Declared Distances

The recommendation of a displaced threshold on the Runway 9R end to meet future runway length requirements would change the current declared distances published. Four different lengths are calculated for operations to/from each end of a runway with declared distances. These distances, which are used by pilots to determine whether or not their aircraft in a given configuration can takeoff or land on a particular runway, include:

TORA	Takeoff Run Available
TODA	Takeoff Distance Available
ASDA	Accelerate Stop Distance Available
LDA	Landing Distance Available



Source: ESA, 2016

FIGURE 6-4

FUTURE AIRFIELD IMPROVEMENTS

For runways without a displaced threshold, the single RPZ would begin 200 feet beyond the physical end of a runway. When there is a displaced threshold, separate Approach and Departure RPZs are typically established. The Approach RPZ would begin 200 feet prior to the landing thresholds, while the Departure RPZ would begin 200 feet beyond the length declared for the TORA. The existing declared distances and those that would result from the recommended alternative are included in **Table 6-1**.

TABLE 6-1
DECLARED DISTANCES FOR RUNWAY 9R/27L

	TORA	TODA	ASDA	LDA
Existing				
Runway 9R	10,181’	10,181’	10,181’	10,181’
Runway 27L	10,181’	10,181’	10,181’	9,482’
Future - Recommended Improvement				
Runway 9R	11,600’	11,600’	11,600’	10,181’
Runway 27L	11,600’	11,600’	11,600’	10,901’

SOURCE: ESA, 2016.

As shown, the addition of a 1,419 foot displaced threshold on the west end of Runway 9R/27L would accommodate the calculated lengths of 11,600 feet for takeoffs and 8,500 feet for landings by the future Boeing 747 critical aircraft.

Consideration for Approach Lighting System

While the recommended extension of 1,419 feet to the west with a displaced threshold does not require the relocation of the existing Runway 9R MALSR, a portion of the system will need to include in-pavement light fixtures. However, none of the sequenced flashing lights would need to be in the runway pavement since the closest flashing light fixture is located 1,600 feet from the existing threshold. This is advantageous since airfield lighting manufacturers recommend installing flashing light fixtures above ground so that their electronics are not below grade. It has been reported that below grade installations, especially in an environment like Florida, tend to cause more maintenance issues with the flashing unit electronics. For the 1,419 foot extension, all of the flashing light fixtures could be installed on frangible mounts with the closest unit located within the future paved blast pad. Special consideration would be given to the installation and maintenance of the in-pavement lights during the runway extension’s engineering design phase.

6.3.3 North Parallel Runway 9L/27R

An ultimate length of 7,000 feet was recommended for Runway 9L/27R to better accommodate large business jet aircraft that use the general aviation facilities and require access to the commercial aeronautical businesses located on the north side of MLB. In addition, the ultimate runway length would accommodate commercial passenger aircraft with fewer operational restrictions when the primary runway is unavailable. While the type of aircraft that would justify

this length do not currently conduct 500 annual operations on the north parallel runway, the ability to provide this ultimate runway length in the future was evaluated.

Additionally, it should be noted, that when the critical aircraft for this runway changes to an Airplane Design Group (ADG) III aircraft, the RSA will increase from a width of 400 feet to 500 feet. When this occurs, ditches running along both the north and south sides of the runway will need to either be relocated or culverted in order to obtain the proper RSA grading criteria. This requirement may or may not occur with the need to extend the runway.

6.3.3.1 Improvement Options to the East of Runway 9L/27R

Two opportunities for increasing the useable length of Runway 9L/27R to the east are illustrated in Figure 6-2.

Extend Runway 9L/27R East 500 Feet

Extending Runway 9L/27R to the east by 500 feet would provide 6,500 feet of useable runway length for takeoffs in both directions. However, while the runway extension, as well as the extended RSA, extended ROFA, and new RPZ would all be within the existing airport property limits, approximately 3.0 acres of the new RPZ would overlap property which is presently optioned to a major airport tenant for future expansion. As such, the future use of this land would be subject to the FAA's interim RPZ guidance. Also, the northeast corner of the extended RSA would end approximately at the edge of the Taxiway K pavement.

Aircraft access to the new runway end from the facilities on the north side of the airfield would connect off of Taxiway K. Taxiway K would also provide access to the new runway end from the southeast part of the airfield.

Extend Runway 9L/27R East 1,000 Feet

A 1,000 foot extension to the east of the current Runway 9L/27R pavement could occur as a second phase (additional extension of 500 feet) to the 500 foot extension described above or both improvements could be accomplished under one project. In either scenario, this improvement would provide the recommended 7,000 feet of useable runway for takeoffs in both directions. While the runway extension, extended RSA, extended ROFA, and new RPZ would all be within the existing airport property limits, approximately 3.7 acres of the new RPZ would overlap property which is presently optioned to a major airport, as well as other vacant developable space east of Taxiways H and K. As such, the future use of this land would be subject to the FAA's interim RPZ guidance. Also, the northeast corner of the RSA would encompass portions of Taxiways H and K.

Aircraft access to the new runway end from the facilities on the north side of the airfield would connect off of Taxiway K. Taxiway K would also provide access to the new runway end from the southeast part of the airfield.

6.3.3.2 Improvement Options to the West of Runway 9L/27R

Two opportunities for increasing the useable length of Runway 9L/27R to the west are illustrated in Figure 6-3.

Extend Runway 9L/27R West 500 Feet

Extending Runway 9L/27R to the west by 500 feet would provide 6,500 feet of useable runway length for takeoffs in both directions. In addition, Taxiway K would be extended west to the new runway threshold. However, while the runway and taxiway extension, as well as the extended RSA and ROFA would all remain within the existing airport property limits, approximately 1.1 acres of the new RPZ would extend beyond. While this off-airport area does not encompass any incompatible uses, it would still require coordination with the FAA with regard to their interim RPZ guidance.

There would be some indirect wetland impacts associated with the clearing of trees in wetland areas for the 14 CFR Part 77 surfaces, modifications required to existing airport drainage ditches, and consideration needed for the areas which contain habitat potentially suitable for the scrub jay.

Extend Runway 9L/27R West 1,000 Feet

A 1,000 foot extension to the west of the current Runway 9L/27R pavement could occur as a second phase (additional extension of 500 feet) to the 500 foot extension described above or both improvements could be accomplished under one project. In either scenario, this improvement would provide the recommended 7,000 feet of useable runway for takeoffs in both directions and Taxiway K would be extended west to the new runway threshold. However, while the runway and taxiway extension, as well as the extended RSA and ROFA would all remain within the airport property limits, approximately 15.3 acres of the new RPZ would extend beyond. Since this off-airport area has existing business uses, it will be subject to the FAA's interim RPZ guidance.

There would be some indirect wetland impacts associated with the clearing of trees in wetland areas for the 14 CFR Part 77 surfaces, modifications required to existing airport drainage ditches, and consideration needed for the areas which contain habitat potentially suitable for the scrub jay.

6.3.3.3 Options Eliminated for Runway 9L/27R

The following potential improvement options were eliminated from further consideration in developing the recommended alternative to increase the useable length of Runway 9L/27R.

Extend Runway 9L/27R East 500 Feet (Not Recommended)

The potential to extend Runway 9L/27R east by 500 feet was explored since it would keep the new RPZ, RSA, and ROFA on-airport property. However, it is possible the FAA might limit future on-airport development within the new RPZ limits to meet the objectives of their interim RPZ guidance. The new RPZ limits would also encompass the DVOR and its distance measuring equipment and monitoring antennae. While these are not considered incompatible uses, they would penetrate the associated 14 CFR Part 77 Approach Surface by as much as 15 feet each. This would likely result in a need to increase the instrument approach landing minimums associated with the runway.

In addition, this option would likely impact the ability for aircraft to move unrestricted along a portion of Taxiway K, east of the proposed runway extension, due to the proximity of the new RSA.

When these issues are combined with the loss of on-airport development space within the new RPZ limits, it is not considered a feasible improvement to increase the useable runway length.

Extend Runway 9L/27R East 1,000 Feet (Not Recommended)

While the 500 foot extension east was not considered feasible, the full extension of 1,000 feet east was evaluated since it could provide the useable runway length identified in the facility requirements chapter. Unfortunately, the full extension would create even greater penetrations to the 14 CFR Part 77 Approach Surfaces and impact even more of the developable space on the east side of the airfield.

In addition, since the extended RSA would cover approximately 700 linear feet of Taxiway K and nearly half of Taxiway H, aircraft taxiing through these areas would have to be managed by the ATCT to hold short for departures off of Runway 9L and arrivals to Runway 27R. For these reasons, the extension of the runway 1,000 feet east is not considered a feasible improvement to increase the useable length.

Extend Runway 9L/27R West 1,000 Feet (Not Recommended)

Approximately 15.3 acres of the new RPZ would extend off-airport property and encompass six structures, roads within the industrial area, and several vehicle parking lots. The FAA's interim RPZ guidance would likely require the acquisition of this land and the relocation of at least six businesses. The costs associated with these acquisitions and relocations alone make the full 1,000 foot extension unreasonable.

6.3.3.4 Recommended Improvement for Runway 9L/27R

Extending Runway 9L/27R to the west by 500 feet would provide additional runway length to better accommodate large general aviation aircraft and the occasional use by commercial service aircraft. When compared to the other alternatives evaluated for this runway, this alternative would have no community impacts and limited environmental concerns. Therefore, the ability to extend Runway 9L/27R and its associated taxiway system 500 feet to the west is the recommended north parallel runway alternative.

While this alternative does not provide the full 7,000 feet of runway length recommended in the facility requirements chapter, it is well within the runway length range recommended by the FAA methodology for large aircraft weighing up to 60,000 pounds. It also provides the length required for nearly every commercial service aircraft serving or expected to serve MLB, as well as those general aviation aircraft over 60,000 pounds to operate with no or minimal restrictions on the average 1,000 nautical mile trip analyzed as part of the facility requirements. It is also interesting to note that the 500 foot extension to the west would decrease the amount of the RPZ going off-airport property by approximately 0.3 acres.

Taxiway K will also need to be extended 500 feet west to provide aircraft access to the future end of Runway 9L. Also the optimal taxiway exit ranges described in the facility assessment and requirements chapter will also shift 500 feet west for landings on Runway 9L. With this shift the smaller aircraft will have Taxiway M within the optimal exit range, while Taxiway Q will be just under 200 feet after the optimal range. For the larger aircraft the opposite is true. Taxiway Q will

be within the optimal exit range while Taxiway M will be just under 200 feet prior to the optimal range. The number of exists for landings on Runway 27R will change; therefore, the addition of another exit taxiway would not provide any real benefit to landing operations on Runway 9R. The recommended improvement to extend the north parallel runway west by 500 feet is shown on Figure 6-4.

6.4 Taxiway System Improvements

The following sections address different improvements recommended for the ultimate configuration of the airport's taxiway system. This includes both new and re-aligned taxiways to serve the future runway system as well as to address those areas requiring modification to meet the current FAA taxiway standards. Other improvements to accommodate the expected demand are included in subsequent sections of this chapter as many depend on the final recommended alternatives for different airfield area uses.

6.4.1 Taxiway C

The portion of Taxiway C between the parallel runways does not meet the current FAA taxiway standard for 90 degree intersections with the runways. Figure 6-4 shows the required re-alignment of Taxiway C, which would also replace the portion of Taxiway V between Runway 9R/27L and Taxiway A. While the re-alignment would not create any significant operational improvements over the current Taxiway C alignment, it would improve pilot visibility for the intersection departures coming out of the Central Apron area when the runways are in a west flow.

In removing the current portion of Taxiway C between Runway 9R/27L and Taxiway A, this re-alignment would also require a change in the taxiway designations, since the existing north and south portions of Taxiway C would no longer connect. For simplicity, the north half should be designated as Taxiway V and the portion south of Taxiway A should remain as Taxiway C as part of the re-alignment project.

Taxiway C also does not meet the current FAA taxiway standards where it currently crosses Runway 5/23. However, at the time of this writing, the project to rehabilitate Runway 5/23 will include the removal and replacement of Taxiway C where it connects to both sides of Runway 5/23. This will allow Taxiway C between Taxiway D and Taxiway F to have the proper right angle intersections with Runway 5/23.

6.4.2 Taxiway N

While serving as a connector for different aircraft depending on the direction of operations on Runway 9R/27L, the curved Taxiway N does not meet the current FAA taxiway design standards for 90 degree intersections with a runway. The re-alignment (straightening) of this connector taxiway should be considered either as part of the next pavement rehabilitation project for Runway 9R/27L or as part of the proposed runway extension west; whichever may be implemented first. This realignment is depicted on Figure 6-4.

6.4.3 Existing Direct Access Taxiways

There are four locations where existing taxiways do not fully meet the current FAA standard to avoid direct access from an aircraft parking apron to a runway, without a turn. Two of these include the north end of Taxiway C which accesses Embraer's facilities and the south end of Taxiway Q which serves Northrop Grumman's facilities. The aircraft parking aprons located off these taxiways are not utilized by the public and do require some maneuvering/turning from the actual aircraft parking areas, before being in a position to directly access the runway environment. The other two locations include both Taxiways A and R, which provide access across Runway 5/23 for the passenger terminal apron. These taxiways are almost exclusively used by the commercial air carriers.

There have been no incursions reported for any of these four taxiway areas. As documented in the facility requirements, a July 2015 Runway Incursion Mitigation (RIM) report was conducted based on five incursions reported for Runway 5; however, these were related to the newer Central Apron activity at that time, as well as the heavy flight training operations to/from Runway 5. No alternatives for the four taxiway locations described above have been considered as the operations in these areas are limited to the private leaseholds and commercial service operations. They should however be monitored in case the operational characteristics change in the future.

6.4.4 New Taxiways

As noted previously, Figure 6-4 depicts the extensions of both Taxiways A and K west to provide access to the future parallel runway ends. For Taxiway K, this also includes widening the section west of Taxiway M (currently 40 feet wide) to match the rest of the taxiway's 50 foot width to support Taxiway Design Group (TDG) 3 aircraft. In the future, additional parallel taxiway access will be required to support the safe and efficient movement of aircraft to/from and between the parallel runway system.

For Runway 9L/27R this would include a south parallel taxiway system with a centerline separation distance of 400 feet to fully accommodate the future Runway Design Code (RDC) of C-III. The 400 foot runway-to-taxiway centerline separation distance cannot be provided on the north side of the runway due to existing structures. The recommended future parallel Taxiway B is shown on Figure 6-4. This taxiway would be in alignment with the current geometry of the turnaround Taxiway B.

A new taxiway connecting the west ends of the parallel runways is recommended. Ultimately, the taxiway would connect and provide access between the proposed Runway 9L/27R threshold and the existing Runway 9R threshold, as well as Taxiway A on the south side of Runway 9R/27L. The taxiway would also connect to the ultimate partial parallel taxiway proposed on the north side of Runway 9R/27L, west of the runway's existing threshold. As shown on Figure 6-4, this would provide access to the future departure end of Runway 9R from the north side of the airfield, without having to cross the primary runway.

6.4.5 Aircraft Run-up Areas

As noted in the facility requirements chapter, dedicated aircraft run-up areas and/or bypass taxiway capability would increase the ability for aircraft to depart more efficiently during peak periods that include numerous student pilots and flight training. Based on the runway and taxiway flow analysis conducted for this Master Plan update, run-up areas for student pilots should be considered at the departure ends of Runways 9R, 9L, and 27R. Because most flight training takeoffs using Runway 27L originate from the Central Apron area (which has its own run-up areas) and typically utilize Taxiway V for intersection departures, a new run-up area at 27L is not needed. As there are not a lot of options when locating a run-up area to serve a particular runway end, the following describes the considerations made for planning these future improvements, as well as areas serving aircraft maintenance and manufacturing engine run-ups.

6.4.5.1 Existing End of Runway 9R

For Runway 9R, a run-up area to serve the existing runway threshold is recommended because there is a present need for commercial and large general aviation aircraft to bypass flight training aircraft on Taxiway A during peak periods. When the departure end of Runway 9R is extended, this bypass area would not need to be relocated since training aircraft will not likely taxi to the new Runway 9 end, rather they would most likely make an intersection departure at the existing/future landing threshold of Runway 9R. As described above, this is similar to what most flight training aircraft originating from the Central Apron area do via Taxiway V when Runway 27L is in use.

While the run-up area should be located as close as possible to the entry point of the runway for departure, the one recommended to serve the existing Runway 9R end has been located slightly east, in alignment with Taxiway L. This location will avoid conflict with a site currently being developed to the south of the Runway 9R threshold, which will have taxiway access to the end of Taxiway A. For planning purposes, the proposed run-up area has been sized to accommodate a mix of four small general aviation (single-engine or light multi-engine) aircraft, while allowing bypass capability for ADG V aircraft on Taxiway A.

6.4.5.2 Future End of Runway 9L

A run-up area capable of accommodating four small general aviation aircraft, while providing bypass capability for up to ADG V, has also been shown for the future departure end of Runway 9L. However, this run-up area has a slightly different shape than the one shown for Runway 9R in an effort to avoid the potential wetland areas to the immediate west as depicted on Figure 6-4. A run-up area in this location would remain on-airport property, would not preclude the ability to for taxiway access to potential development sites immediately north of the current Runway 9L threshold, and could be constructed before Runway 9L/27R or Taxiway K are extended west.

6.4.5.3 Departure End of Runway 27R

Due to existing facilities and the limited space between Taxiway K and the runway, a run-up area for the departure end of Runway 27R is not feasible. However, should a significant need for such by-pass capability materialize in the future, an additional connector taxiway could be constructed to facilitate the movement of aircraft when Runway 27R is being used for departures.

6.4.5.4 Run-Ups for Aircraft Maintenance and Manufacturing

Engine run-ups associated with aircraft maintenance and aircraft assembly are conducted at different locations on the airfield, depending on the type of testing and level of airfield activity at the time of the run-up. Some run-ups are conducted on aprons or remote taxiways. Some run-ups occur near the compass calibration pad located on the east side of the airfield and some even on Runway 9L/27R during off peak times. The need to establish one or more dedicated run-up locations on the airfield for aircraft maintenance and manufacturing tenants was not identified at this time. However, MLB should encourage tenants to exercise discretion as to time of day and location when conducting engine run-ups to minimize effects on nearby residential neighborhoods. Future complaints, should they occur, may necessitate establishing dedicated run-up locations for the larger aircraft engine testing.

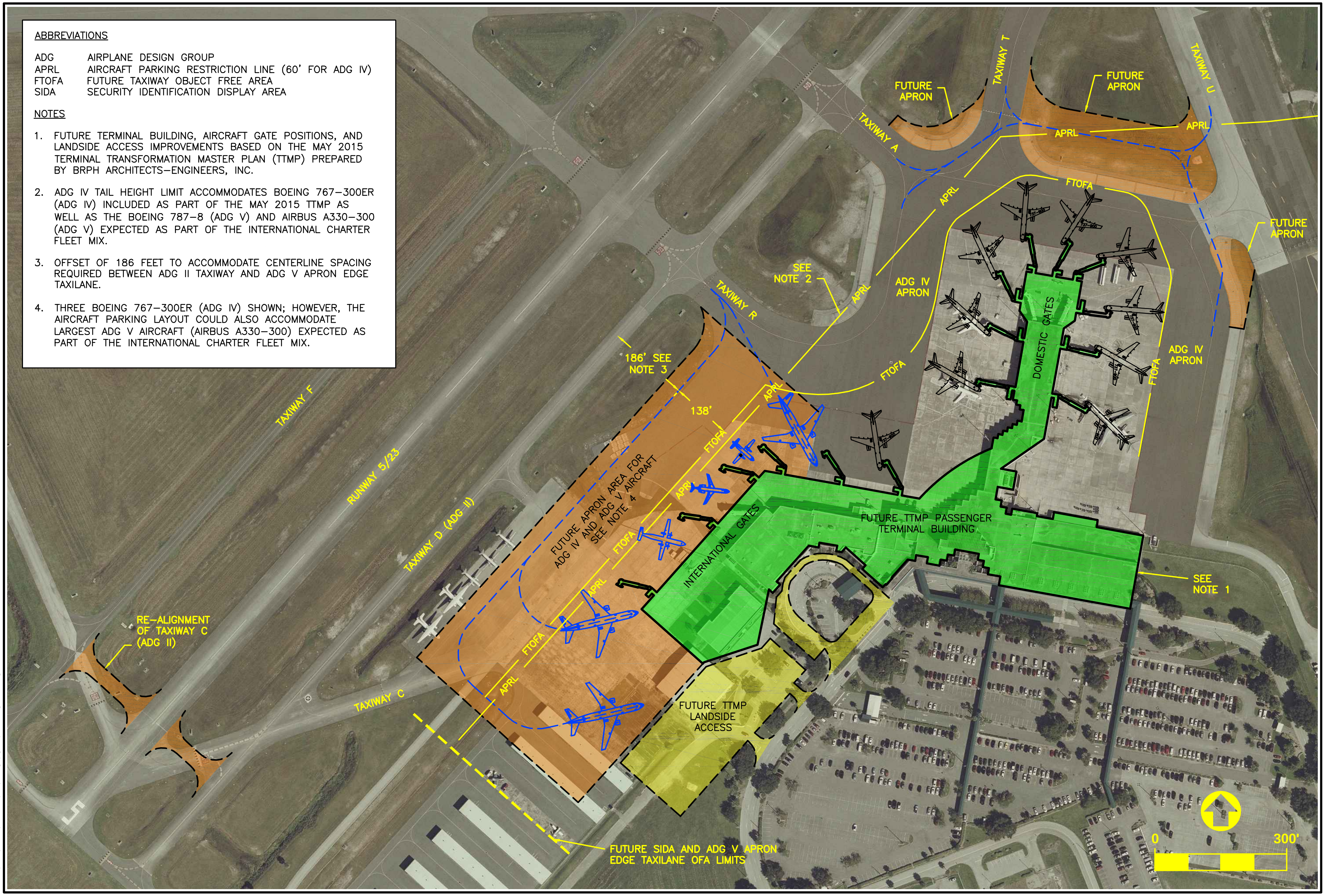
6.5 Passenger Terminal Area Facilities

The May 2015 Terminal Transformation Master Plan (TTMP) prepared by BRPH Architects-Engineers, Inc., provided conceptual plans by which the passenger terminal building could be renovated and expanded to meet the demand expected through 2035. In general, the TTMP would renovate and modernize the passenger terminal building in three phases, with the potential for additional expansion should activity exceed the base projection of the 20-year passenger forecast. The scope of the TTMP study was limited to evaluating the terminal building structure and its immediate envelope. Therefore, options for the development of attendant airside and landside facilities were evaluated in this section of the Master Plan update.

Because the TTMP’s passenger terminal expansion plan included aircraft gate positions associated with the interior elements of the building, these gates locations were retained. Therefore, this evaluation focused on how to best develop airside components (e.g., aprons and taxiways) to serve the planned terminal and not affect the utility of nearby aprons, taxiways, and runways. Landside, there were more options to consider for the different terminal facilities. As such, three conceptual layouts are presented to compare different attributes of the landside components.

6.5.1 Aircraft Parking Positions and Airside Access

The combined phases of the TTMP would provide a total of 12 domestic and three international aircraft parking gates (there are currently six domestic and one international). Because the scope of the TTMP did not include a detailed analysis of the adjacent airfield facilities, adjustments were necessary to the aircraft parking positions proposed in order to tie into the aircraft parking apron, taxiways, and taxilanes in the vicinity of the passenger terminal. These modifications, included in **Figure 6-5**, reflect a change in the ultimate number of domestic and international gates to illustrate the flexibility needed to accommodate projected changes in the types of commercial service aircraft serving MLB.



ABBREVIATIONS

ADG	AIRPLANE DESIGN GROUP
APRL	AIRCRAFT PARKING RESTRICTION LINE (60' FOR ADG IV)
FTOFA	FUTURE TAXIWAY OBJECT FREE AREA
SIDA	SECURITY IDENTIFICATION DISPLAY AREA

NOTES

1. FUTURE TERMINAL BUILDING, AIRCRAFT GATE POSITIONS, AND LANDSIDE ACCESS IMPROVEMENTS BASED ON THE MAY 2015 TERMINAL TRANSFORMATION MASTER PLAN (TTMP) PREPARED BY BRPH ARCHITECTS–ENGINEERS, INC.
2. ADG IV TAIL HEIGHT LIMIT ACCOMMODATES BOEING 767–300ER (ADG IV) INCLUDED AS PART OF THE MAY 2015 TTMP AS WELL AS THE BOEING 787–8 (ADG V) AND AIRBUS A330–300 (ADG V) EXPECTED AS PART OF THE INTERNATIONAL CHARTER FLEET MIX.
3. OFFSET OF 186 FEET TO ACCOMMODATE CENTERLINE SPACING REQUIRED BETWEEN ADG II TAXIWAY AND ADG V APRON EDGE TAXILANE.
4. THREE BOEING 767–300ER (ADG IV) SHOWN; HOWEVER, THE AIRCRAFT PARKING LAYOUT COULD ALSO ACCOMMODATE LARGEST ADG V AIRCRAFT (AIRBUS A330–300) EXPECTED AS PART OF THE INTERNATIONAL CHARTER FLEET MIX.

Source: ESA, 2016.

FIGURE 6-5

TERMINAL TRANSFORMATION MASTER PLAN LAYOUT WITH AIRSIDE IMPROVEMENTS

6.5.1.1 Domestic Aircraft Parking and Access

The TTMP recommended the construction of additional space at the end of the existing passenger concourse. This expansion would increase the number of domestic gates from six (current) to nine. All of the gates could accommodate the largest ADG III narrow-body fleet expected to be utilized by MLB's regularly scheduled air carriers, including the Airbus A320 and Boeing 737 series aircraft. The expanded "pier" concourse could also accommodate the larger Boeing 757 (ADG IV) size aircraft. The TTMP also included three additional domestic gates of similar size along the face of the expanded terminal building, between the existing single international gate and terminal concourse. However, as described in the following section, two of these domestic gate positions would need to be reconfigured to provide the flexibility needed to accommodate larger international passenger service aircraft.

Figure 6-5 shows the additional paved apron areas that would be required around the north end of the domestic gates. These expanded pavement areas are needed to maintain the existing ADG IV apron edge taxilane around the future domestic concourse.

6.5.1.2 International Aircraft Parking and Access

To provide the greatest flexibility for the international charter aircraft, the three wide-body aircraft parking positions depicted in the TTMP concept opposite of Runway 5/23 and Taxiway D have been adjusted. As reflected on Figure 6-5, one has been moved to the middle gate of the three domestic gates along the future face of the terminal described above. The other two have been relocated to the southwest side of the future terminal building footprint. Aside from added flexibility, this modification is necessary to provide the proper setbacks to the adjacent runway and taxiway system for the wide-body aircraft expected. This adjustment enables the future terminal facility as proposed in the TTMP to accommodate the largest ADG V wide-body aircraft (Airbus A330-300 and Boeing 787-800) envisioned in the activity forecasts for international charter.

Placement of the larger wide-body aircraft parking positions around the proposed terminal building is necessary given the airfield setbacks required for the tail heights of these aircraft. It also provides space necessary to construct an ADG V apron edge taxilane for the movement of aircraft between the international gates and Taxiway R. This spacing includes a 186 foot offset from Taxiway D to meet the required centerline separation distance between this existing ADG II taxiway and a future ADG V apron edge taxilane. These gate adjustments and apron area improvements are reflected on Figure 6-5 in addition to the future Security Identification Display Area (SIDA) limit that needs to be preserved for the proposed terminal expansion plan.

Figure 6-5 also illustrates how the original three wide-body gates proposed in the TTMP could be used for smaller international commercial aircraft. For illustrative purposes, the aircraft shown at these gates include the Bombardier Q400 currently operated by Porter Airlines to Canada; the Bombardier CRJ-200 regional jet currently operated by Elite Airways to international charter destinations such as the Bahamas and Caribbean; and the smaller Saab 340 that Florida-based Silver Airways operates on routes to the Bahamas and Cuba.

It should be noted that in making the adjustments to properly accommodate the larger wide-body fleet expected, two of the 12 domestic gate positions proposed as part of the TTMP were sacrificed.

These domestic gates were part of the long range plan of the TTMP expansion program. As the airport's domestic and international passenger markets grow, the space and utilization of the gate positions available may change. Should additional domestic gates be required, it is possible that some of the international gates could be utilized for domestic flights during peak periods. The ultimate gate locations and configuration will be based on the demand at the time of design. The same holds true for the associated interior building needs, including expansion of facilities such as the Federal Inspection Services (FIS), which were addressed in the TTMP.

6.5.2 Automobile Parking

Options related to providing the space necessary for public parking, rental car parking, employee parking, and cell phone waiting area functions of the future passenger terminal area are addressed in the following sections. This includes potential changes to the terminal loop road system to access these facilities and to work with the limited landside passenger terminal facilities included as part of the TTMP.

6.5.2.1 Public Parking

An automobile parking analysis conducted by Kimley-Horn and Associates for this Master Plan update identified the need for approximately **2,105** public parking spaces by 2035. Based on the existing layout and use of the terminal parking lot, an additional 1,230 public parking spaces would be required to meet this projected demand for public parking. Currently, the parking lots for public, rental car ready and return, employee, and cell phone waiting within Air Terminal Parkway (the terminal loop road) contain 1,226 total spaces. Not including the leased rental car service areas, these parking lots average 500 square feet per parking space, including access lanes, walkways, and landscaping.

It is possible for future surface parking lots to average 450 square feet per space or even slightly less. However, narrow parking stalls and access lanes can introduce inconveniences and lessen customer satisfaction. But even at this reduced spatial requirement, it would take almost the entire area encompassed between the terminal loop road and NASA Boulevard (including the current rental car service areas) to provide the total 2,105 public parking spaces needed by 2035. It should also be noted that this space requirement does not include the other automobile parking spaces that ought to be close to the passenger terminal. Therefore, options for expanding public parking evaluated the need for one or more parking structures in the future.

The efficiencies between different parking structures average 300 to 350 square feet per vehicle parking space. For planning purposes, parking structures proposed for MLB were based on 325 square feet per space. If 200 spaces are provided on each deck (65,000 square feet), then a six deck parking structure, along with the surface parking areas would be required to provide the total public parking space expected by 2035. Two concepts for the landside of the passenger terminal area (**Figures 6-6** and **6-7**) include a single six deck parking structure with other surface lot space. A third concept (**Figure 6-8**) includes two six deck parking structures with minimal requirements for other surface lots. A potential alternative to the two parking structures shown in Figure 6-8 would be to construct a larger, single parking structure. While doing so has the possibility to reduce overall costs, it might also limit the ability to phase the construction of the spaces required.

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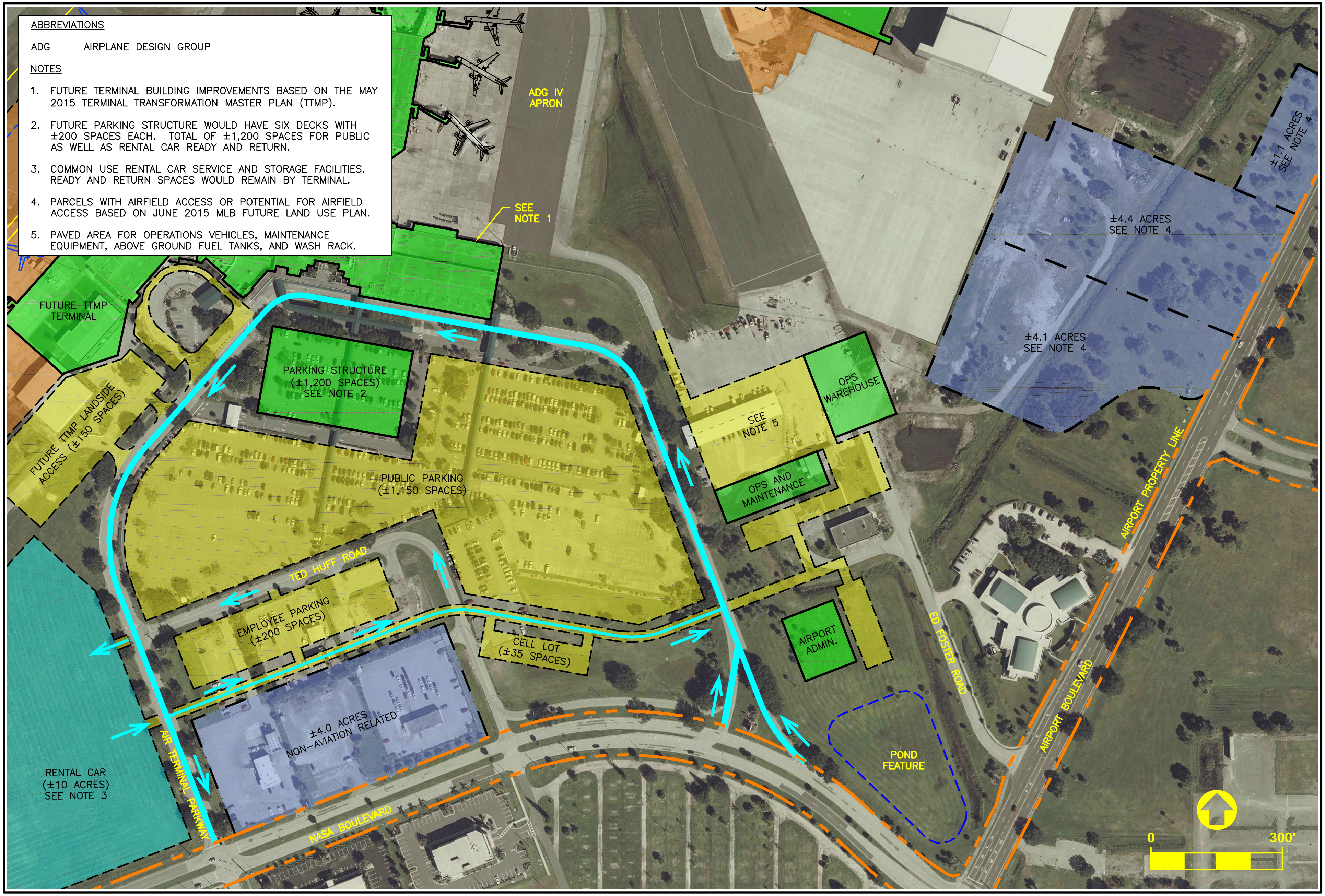
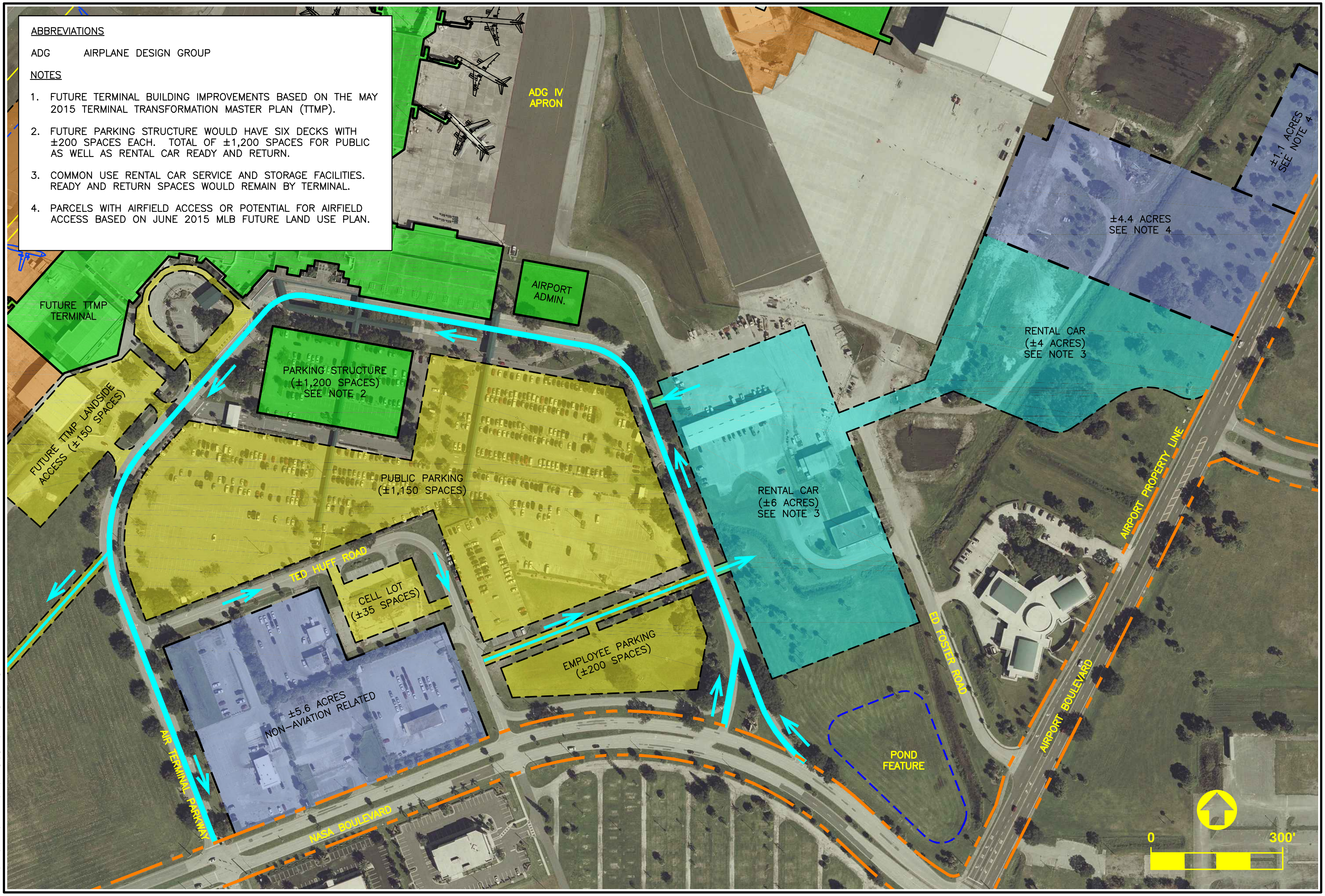
C:\Users\ddicarlo\Documents\MLB\Drawings\Figures\MLB MP Figure 6-6.dwg



Source: ESA, 2016.

FIGURE 6-6

LANDSIDE FACILITIES FOR THE PASSENGER TERMINAL AREA - CONCEPT 1



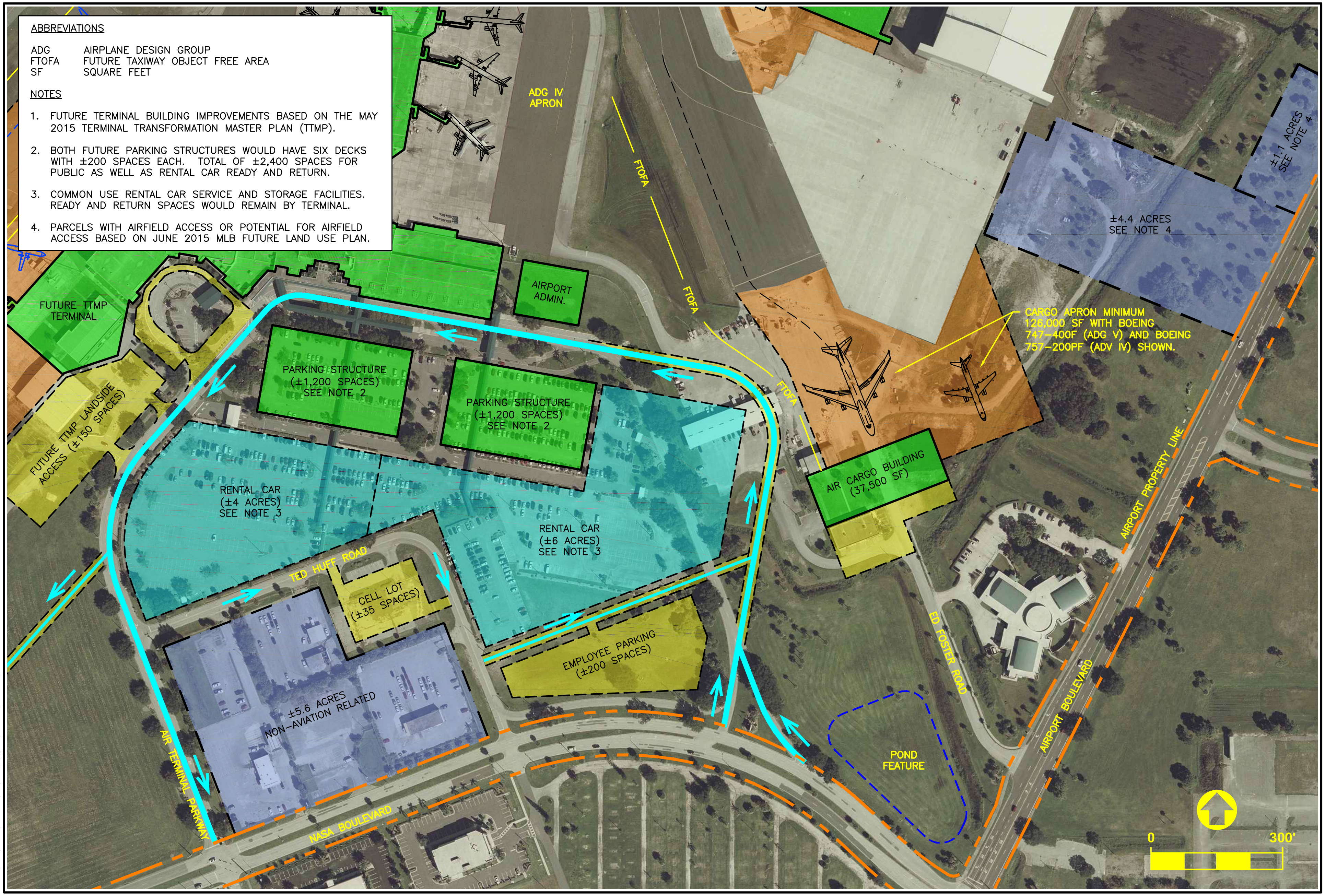
Source: ESA, 2016.

Orlando Melbourne International Airport Master Plan Update - D140023

FIGURE 6-7

LANDSIDE FACILITIES FOR THE PASSENGER TERMINAL AREA - CONCEPT 2

Jan 07, 2017 – 8:06am C:\Users\ddoorle\Documents\MLB\Drawings\Figures\MLB MP Figure 6-7.dwg



Source: ESA, 2016.

FIGURE 6-8
LANDSIDE FACILITIES FOR THE PASSENGER TERMINAL AREA - CONCEPT 3

6.5.2.2 Rental Car Parking and Support Facilities

The parking analysis estimated that by the end of the planning period, the rental car facilities would require 323 to 363 ready and return spaces convenient to the passenger terminal building. For rental car service and storage facilities, a new six acre common-use service and storage facility was proposed. Ideally, this facility should have the ability to expand to approximately ten acres towards the end of the planning period. Therefore, space for approximately **400** ready and return spaces were included as part of the public parking options described above, while an area of up to ten acres was considered when evaluating different sites for the common-use rental car service and storage facilities.

In all three of the concepts for future landside facilities serving the passenger terminal area (Figures 6-6, 6-7, and 6-8) the rental car ready and return spaces would be provided in the lower deck(s) of the proposed parking structures and/or through use of the smaller surface lot adjacent to the future terminal building as proposed in the TTMP. The final locations for future rental car ready and return spaces will be determined at the same time the future parking structure and surface lots are designed.

For the common-use rental car service and storage facilities, the concepts reflect three primary options to keep these facilities near the passenger terminal building. This was a key consideration in developing the concepts as the various meetings, workshops, and discussions with MLB's rental car companies revealed that off-airport rental car service and storage areas were not desirable. The concepts considered in this Master Plan update include locating the common use facilities to the east, west, or inside of the terminal access road loop. For each, consideration was given to provide the most convenient access into and out of these areas from the terminal access road loop, to efficiently move vehicles to/from the ready and return spaces. As indicated, in each case this also includes the possibility of making Ted Huff Road one-way to simplify vehicle flow.

6.5.2.3 Employee Parking

Approximately 200 employee parking spaces should be provided for the passenger terminal area. While these need to be located in close proximity, they would not be placed immediately adjacent to the terminal facilities. In order to keep passenger walking distances to a minimum, the close-in spaces would be used for public parking and rental car ready and return spaces. As such, each of the concepts for the future landside facilities (Figures 6-6, 6-7, and 6-8) locate the employee parking in surface lots, farther out than most other parking.

6.5.2.4 Cell Phone Waiting

Based on the parking analysis, the current 12 spaces in the cell phone waiting lot will need to triple by the end of the 20-year planning period. As with employee parking, these spaces do not need to be adjacent to the passenger terminal, rather just convenient to the terminal access road system without going out to NASA Boulevard. All three of the concepts for the future landside facilities (Figures 6-6, 6-7, and 6-8) accomplish this by locating a minimum **35** space surface lot right off of a one-way return loop to the passenger terminal building.

6.5.3 Airport Administration Space

To accommodate the anticipated increase in international passenger service at MLB, the TTMP Phase 2 proposed improvements to the international terminal that would expand the secure hold room and provide a walkway from the international terminal to the domestic terminal. This plan requires use of the airport administration office space located on the second floor of the terminal. This area, which includes the MAA Board Room, is approximately 36,800 square feet.

The identification of locations to replace administration space first considered areas within the terminal building. A review of the TTMP and the existing terminal building did not identify feasible locations within the building that would not displace other terminal functions or require substantial building modifications. However, it may be possible to add a third floor or even expand the building to the east, next to the ticketing area, to provide replacement administration space. While these options could be evaluated in detail as part of the different terminal improvement phases, space for a new stand-along site should also be preserved. Therefore, sites for a new stand-alone administration building in proximity to the passenger terminal building were considered. Two sites were identified and included as part of the future landside facility concepts. One site is located close to the airport entrance, just north of NASA Boulevard (see Figure 6-6). The second site, depicted on Figures 6-7 and 6-8, is located adjacent to the east end of the passenger terminal building. Both concepts reflect a nominal building footprint approximately 18,750 square feet in size. The building is envisioned, at a minimum, to be a two-story structure providing at least of 37,500 square feet of space. The building design process would determine the building's configuration and space allocation requirements.

6.5.4 Airport Operations and Maintenance Buildings

The existing airport operations and maintenance buildings are located east of the passenger terminal building and terminal loop road. These military-era buildings are insufficient in size and are not configured for the present needs of maintaining the airport and its facilities. As noted in the facility requirements chapter, there is a need for two new larger buildings to house equipment and maintenance activities. The option that would construct new operations and maintenance facilities at their current location is reflected on Figure 6-6. Figures 6-11, 6-14, and 6-15 depict an alternate location, which would place the new facilities between the existing ATCT and the airfield lighting vault. Both sites reflect the space needed to accommodate a 30,000 square foot building for storage and enclosed equipment parking and a 20,000 square foot building containing space for a machine shop, five bay fleet maintenance area, and office space. Development of the selected site should include a paved vehicle parking lot and truck delivery area; a paved ramp for prepping and inspecting maintenance equipment and mowers; a dedicated fuel farm with one 10,000-gallon gasoline and one 10,000-gallon diesel tank (both aboveground); and a wash rack.

6.5.5 Recommended Passenger Terminal Area Facilities

Public workshops and several meetings with MLB management and executive staff, MLB tenants, airport users, and local officials were held before the development of concepts and during their evaluation. The proactive outreach revealed a number of preferences for future facilities at MLB. The following summarizes the more significant findings with respect to improving the landside

facilities around the passenger terminal. The information from that process and the associated preferences serve to define the overall airfield development plan included at the end of the chapter.

6.5.5.1 Parking Structure

Only space for a single parking structure should be reserved along with other surface lots as shown in Figures 6-6 and 6-7. This eliminated the option for the two parking structures shown in Figure 6-8 which was primarily conceived to accommodate the ten acre common-use rental car service area inside the terminal access road loop.

The timing of the proposed parking structure was a recurring question during the different discussions. Even though the current surface lots provide adequate public parking for most of the year, it was recognized that it would only take the entrance of one new carrier at MLB with regularly scheduled passenger service to literally change that overnight. Therefore, the development program must identify the most realistic time to begin the process necessary to design and construct the parking structure.

6.5.5.2 Rental Car Parking and Support Facilities

Without the option for two parking structures, the concept of providing the common-use rental car facilities inside the terminal access road loop is not realistic. Even with the two parking structures, the ability to provide the ten acre space necessitated realigning a section of the terminal access road (as shown in Figure 6-8). Any other option would eliminate the ability to place the employee parking reasonably close to the terminal building or to have the cell phone waiting lot in a convenient location.

In regard to siting the common-use rental car facilities west of the terminal loop road (Figures 6-6 and 6-16), it was largely agreed that this would not be the highest and best use of this land. The preferred concept is shown to the east of the terminal loop road in Figure 6-7. Initial development of this site for rental car cleaning and storage is dependent on the relocation of the airport operations and maintenance facilities. This site could be expanded to include additional rental car storage space and is compatible with existing uses on this portion of the airport.

6.5.5.3 Terminal Access Road Loop

As stated previously, realigning a section of the terminal access road loop (as shown in Figure 6-8) would provide additional space within the parking lot for the development of new common-use rental car facilities. It would also require that the existing airport operations and maintenance facilities be relocated first. However, this was also dependent on constructing two parking decks, which was not recommended.

In general, a re-alignment of the current terminal access road is not considered necessary to meet the demands identified over this Master Plan update's study period. The future terminal building footprint as proposed in the TTMP does not require any changes to the adjacent road systems. However, the need to potentially reconfigure the existing lanes at the passenger terminal curbside was identified. As such, the concepts reflect enough space between the terminal building and proposed parking facilities to provide the needed departure/arrival curb length, through travel lanes,

commercial vehicle waiting lane, and commercial vehicle through lane, in addition to direct access into the parking areas.

Access to the terminal building from NASA Boulevard was also discussed on different occasions, especially as it related to improving left hand turns onto the terminal loop road from the eastbound lanes on NASA Boulevard. The present road work on NASA Boulevard will include roadway improvements at the entrance and future signage and landscaping could further improve visibility to the airport. Although the need to reconfigure the intersection or improve turn lanes was not made apparent during this study, MLB management and the City of Melbourne should monitor the intersection as passenger activity at the airport and traffic on NASA Boulevard continue to increase. If traffic studies indicate improvements are warranted, then planning and design would be undertaken to identify necessary improvements.

6.5.5.4 Airport Administration Building

Of the two locations shown in the terminal area concepts, the site immediately adjacent to the east side of the passenger terminal was preferred. In regard to function and efficiency, this site was preferred for being adjacent to the passenger terminal building. Because trends in passenger ticketing processes, the site is not expected to be needed for future expansion of the terminal building. Even though the site shown in Figure 6-6 would work, it does not fit with the other preferred options to relocate the existing facilities and have common-use rental cars to the east of the terminal loop road system.

A third site to the southwest of the passenger terminal was also considered early in the alternatives development process. This site was south of Harry Sutton Road and offered good proximity to the terminal area facilities. However, it was not considered the highest and best use for this area, which has both immediate airside and landside access, making it much more advantageous for an aviation related use development.

6.5.5.5 Airport Operations and Maintenance Facilities

It was agreed that the existing airport operations and maintenance facilities to the east of the terminal loop road were not fixed to their current location by function. As such, the future site between the current ATCT and airfield lighting vault is preferred. The preferred site could be developed without interruption to the current operations and would provide the storage and workshop space also needed for the airfield lighting vault.

6.6 Concepts for Future Airport Facilities

In addition to the airfield and passenger terminal area improvements, decisions are needed to support the future development of all-cargo carrier, large aircraft, Eastern Florida State College, and T-hangar facilities. First, sites available at MLB for aviation related development and use are described. Then the ability for each site to accommodate the different types of aviation facilities and activities were evaluated. This process helped identify realistic and compatible development concepts for inclusion in the recommended airfield development plan.

6.6.1 Sites Available for Aviation Related Development

As a result of the various airfield constraints illustrated in Figure 6-1, there are four primary and two secondary areas available on-airport property for aviation related development. These areas, which have the ability to support the other aviation uses not directly tied to the passenger terminal are identified in **Figure 6-9**.

6.6.1.1 Site A – West Apron Area

This area includes the existing Eastern Florida State College facilities, 48 T-hangar units, and approximately 12 acres of open space. Airside access is available from Taxiways C, D, and V which are designed to ADG II taxiway standards. Landside access to the area would come directly off the terminal access loop road, NASA Boulevard, or Harry Sutton Road. As shown in Figure 6-5, the existing Eastern Florida State College facilities and two of the T-hangar buildings will be impacted by the future passenger terminal SIDA requirements.

6.6.1.2 Site B – Central Apron Area

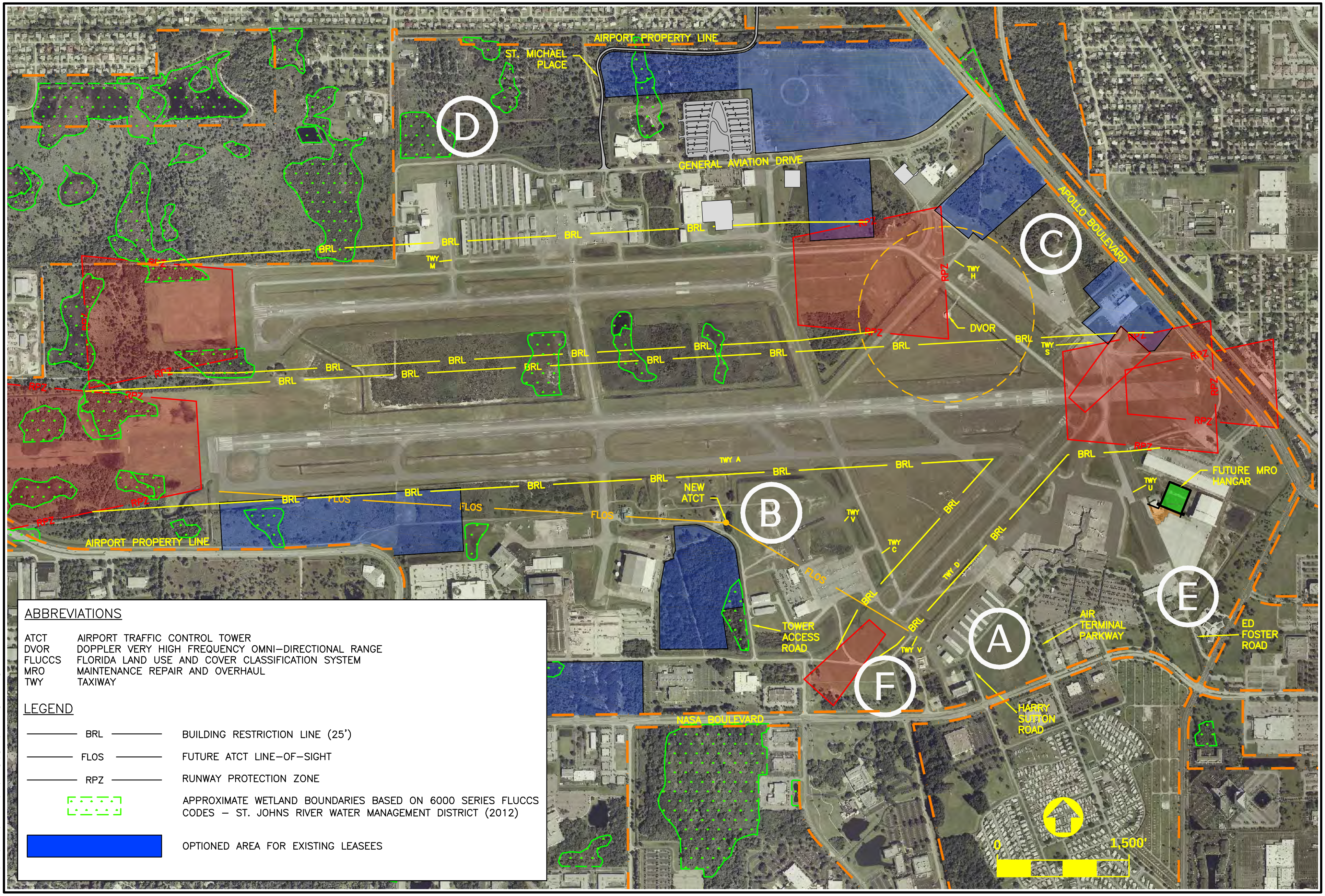
The central apron area primarily consists of the open space north of the existing Florida Institute of Technology's School of Aeronautics (FIT Aviation) facilities and the future ATCT site. It also includes the smaller area between the current ATCT and airfield lighting vault. Although nearly 14 acres of open space is available, future development options may be limited due to the existing/future ATCT line-of-sight requirements, setbacks from the airfield, and existing airfield stormwater management infrastructure. Large aircraft access is available via Taxiway A (ADG IV) from the north while Taxiway V provides airfield access for ADG I aircraft from the west. Landside access would come off Tower Access Road via Harry Goode Way.

6.6.1.3 Site C – Northeast Apron Area

Site C has approximately 26 acres of open space bounded by areas presently optioned for development by existing tenants and other airspace surfaces and set-backs associated with the airfield facilities. Despite its proximity to the approach end of Runway 27R and the DVOR, the site could be developed for most every type of aircraft facility envisioned. Proposed development at this site may necessitate that the required FAA aeronautical study consider potential effects on the DVOR. Airside access is currently provided from Taxiway H and Taxiway S, both of which were designed to ADG II taxiway standards. Landside access would come directly off of Apollo Boulevard.

6.6.1.4 Site D – North Apron Area

Site D represents the single largest portion of airport property available for aviation related development. Bounded by a residential subdivision to the north, General Aviation Drive to the south, the recent extension of St. Michael Place to the east, and vacant land to the west, Site D contains approximately 66 acres of open space. However, development for aviation related use will require the need to extend Taxiway M or a new taxiway constructed to serve the site. For most development options providing the taxiway access would impact existing aviation facilities, including aircraft parking apron and T-hangar buildings, as well as General Aviation Drive. Additionally, Site D does include some wetland areas that need to be taken into consideration.



Source: ESA, 2016.

FIGURE 6-9

SITES AVAILABLE FOR AVIATION RELATED DEVELOPMENT

6.6.1.5 Site E – East Apron Area

Site E is considered one of the secondary development sites as the space available is limited, especially given the existing plans to develop up to three new hangars in this area. Nonetheless, it has been included as it possesses both the airside and landside facilities necessary to support activity projected by the large air cargo aircraft. Taxiway U provides ADG IV access along the west side of the East Apron area. A majority of the current paved areas within the area around Site E are a part of the MRO facility lease area. Landside access would come off Ed Foster Road.

6.6.1.6 Site F – South of Runway 5 Approach

Approximately 6.9 acres of open space is available just south of the approach to Runway 5. In the past, this area has been designated for a high technology manufacturing land use. It has been included as a secondary site because it is capable of supporting small aircraft facilities. In fact, the lower structures typically associated with small aircraft are considered more compatible given the site's proximity to the different imaginary surfaces associated with Runway 5/23. Airside access would need to tie into Taxiway V while landside access would come directly off of NASA Boulevard.

6.6.2 All-Cargo Carrier Facilities

The facility requirements chapter identified the need for approximately 14,000 square yards (126,000 square feet) of aircraft parking apron to support up to two Boeing 747-400F (ADG V) cargo aircraft. Initially this apron space was envisioned next to the existing cargo facility; however, there is not enough space on the airside of the building for this ramp. This is due to the proximity of the Object Free Area (OFA) required for Taxiway U and a second MRO hangar, which at the time of this writing was under design (see Figure 6-9).

An evaluation of each site's ability to accommodate the all-cargo carrier facilities was made based on the criteria shown in **Table 6-2**. Each site was individually assessed using common attributes associated with aviation facility development. For the all-cargo carrier facilities, this took into consideration the required aircraft parking apron space with enough setback to accommodate the ADG V aircraft tail heights of up to 66 feet. The rankings also consider the ability to support the ADG V taxiway access, a 37,500 square foot building, and adequate landside access for trucking.

As shown, Sites C and B ranked the highest. Site F was not included as it did not have adequate space for the airside or landside requirements. Concepts depicting a layout of the required all-cargo carrier facilities were developed for Site C (**Figure 6-10**) and Site B (**Figure 6-11**). While Sites C and B are capable of supporting the operations of two Boeing 747-400F aircraft on the ground at one time, the popular Boeing 757-200PF (ADG IV) cargo aircraft has been substituted as one of the aircraft for comparison purposes. It should be noted that each of the figures also include concepts for other potential development, to illustrate different facility concepts and the site's flexibility.

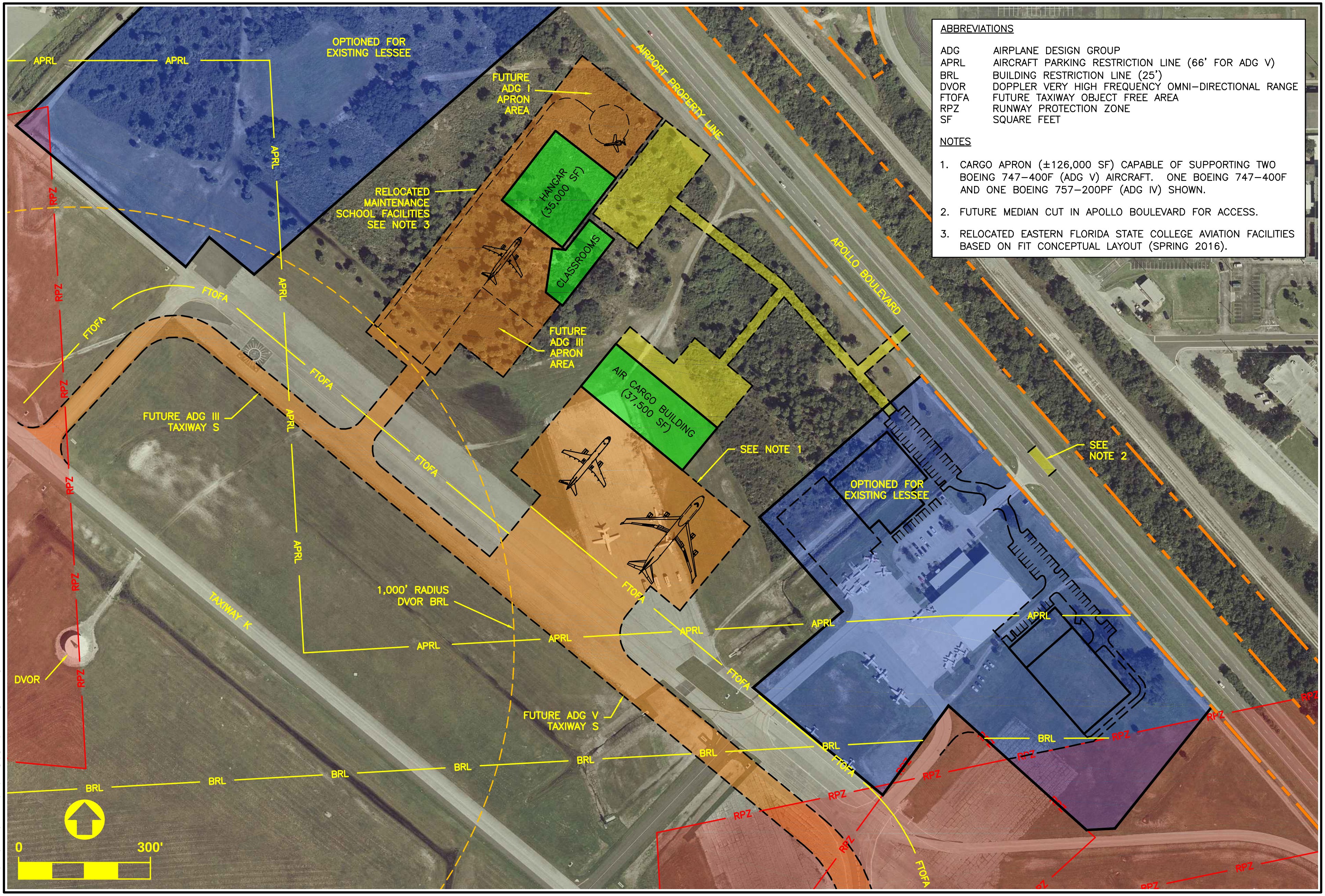
TABLE 6-2
POTENTIAL ALL-CARGO CARRIER FACILITY SITES

Attributes for Proposed Facility	Site A	Site B	Site C	Site D	Site E	Site F
Airside Access for ADG V Aircraft	2	5	3	1	5	n/a
Landside Access	4	4	3	2	5	n/a
Compatibility with Adjacent Uses	4	3	5	3	3	n/a
Impact to Existing Facilities	1	4	5	1	1	n/a
Flexibility of Facility Configuration	3	2	5	5	1	n/a
Potential Environmental Impact	5	4	5	4	5	n/a
Total	**19**	**22**	**26**	**16**	**20**	**n/a**

NOTE: Attributes for each site individually ranked 1-5 with 5 being the best.

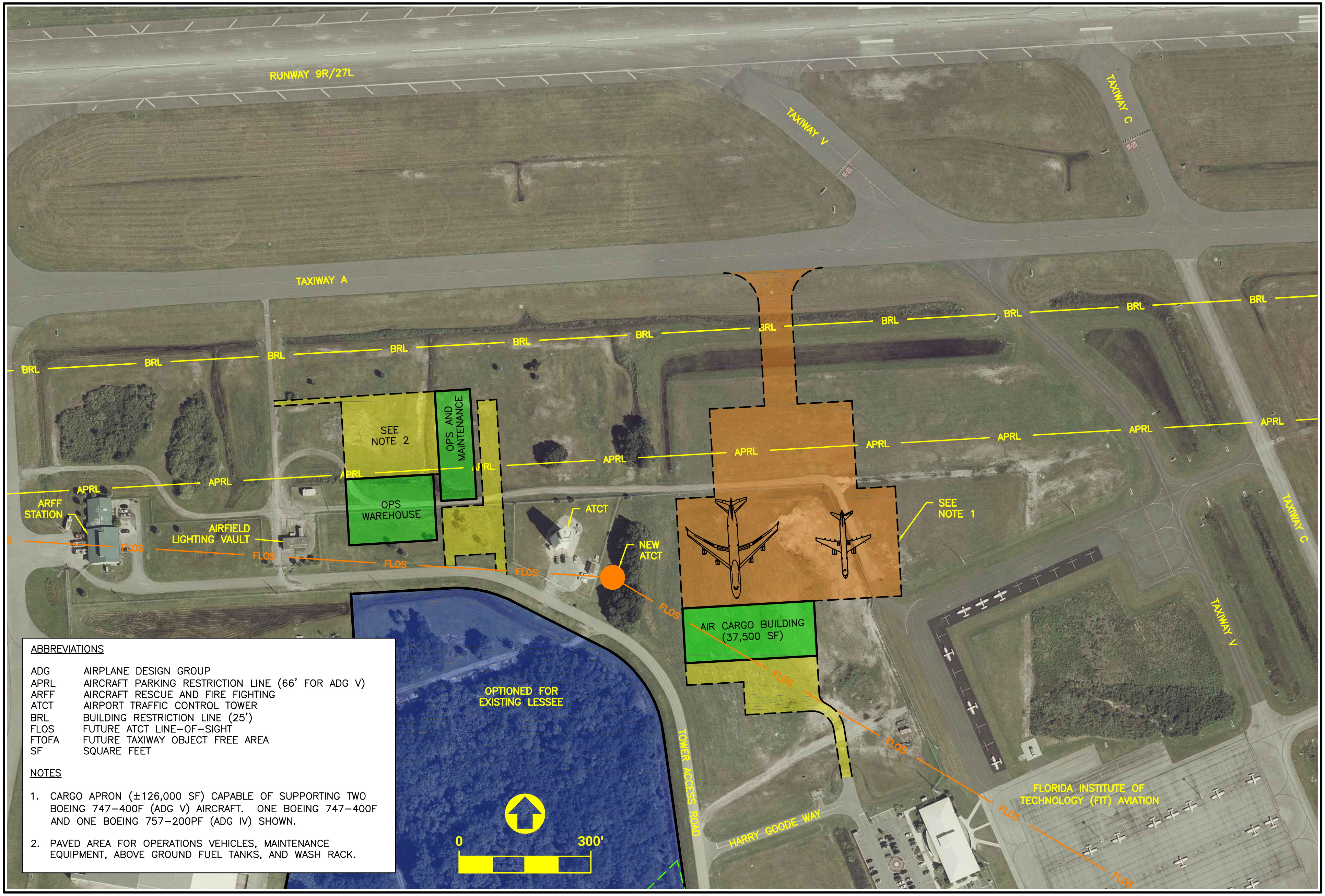
SOURCE: ESA, 2016.

While Sites C and B each have some distinct advantages, Site B has the potential to impact the radio communications of the ATCT due to the larger aircraft engine noise. The ATCT line-of-sight could also be impacted at times when these larger aircraft are maneuvering in or out of their parking apron. Of the two, Site C offers more direct landside access for the trucks that would frequent the facility. Therefore, the Northeast Apron area (Site C) is the preferred site for the development of future all-cargo carrier facilities.



Source: ESA, 2016.

FIGURE 6-10
CONCEPT 1 - NORTHEAST APRON AREA



Source: ESA, 2016.

FIGURE 6-11

CONCEPT 1 - CENTRAL APRON AREA

6.6.3 Large Aircraft Facilities

By the end of the 20-year planning period, it was calculated that an additional 70,240 square yards (632,160 square feet) of aircraft parking apron space would be required to support the anticipated growth in general aviation. A mix of both large and small clearspan hangars was also identified to accommodate the larger aircraft (ADG III) expected. While much of this apron and hangar space would likely be described as fixed base operator (FBO) type facilities, capable of serving these large aircraft, they could also accommodate specific services related to the storage, maintenance, retrofit, or manufacturing of large aircraft. Thus a key element in developing concepts for such large aircraft facilities is to be able to support the ADG III aircraft expected.

An evaluation of each site's ability to accommodate facilities for large aircraft operations was made based on the criteria shown in **Table 6-3**. Each site was individually assessed using common attributes associated with aviation facility development. This took into consideration the capability of providing apron space with enough setback to accommodate the ADG III aircraft tail heights of up to 45 feet. The rankings also consider ADG III taxiway access, space for large aircraft hangars, and landside access.

TABLE 6-3
POTENTIAL SITES FOR LARGE AIRCRAFT FACILITIES

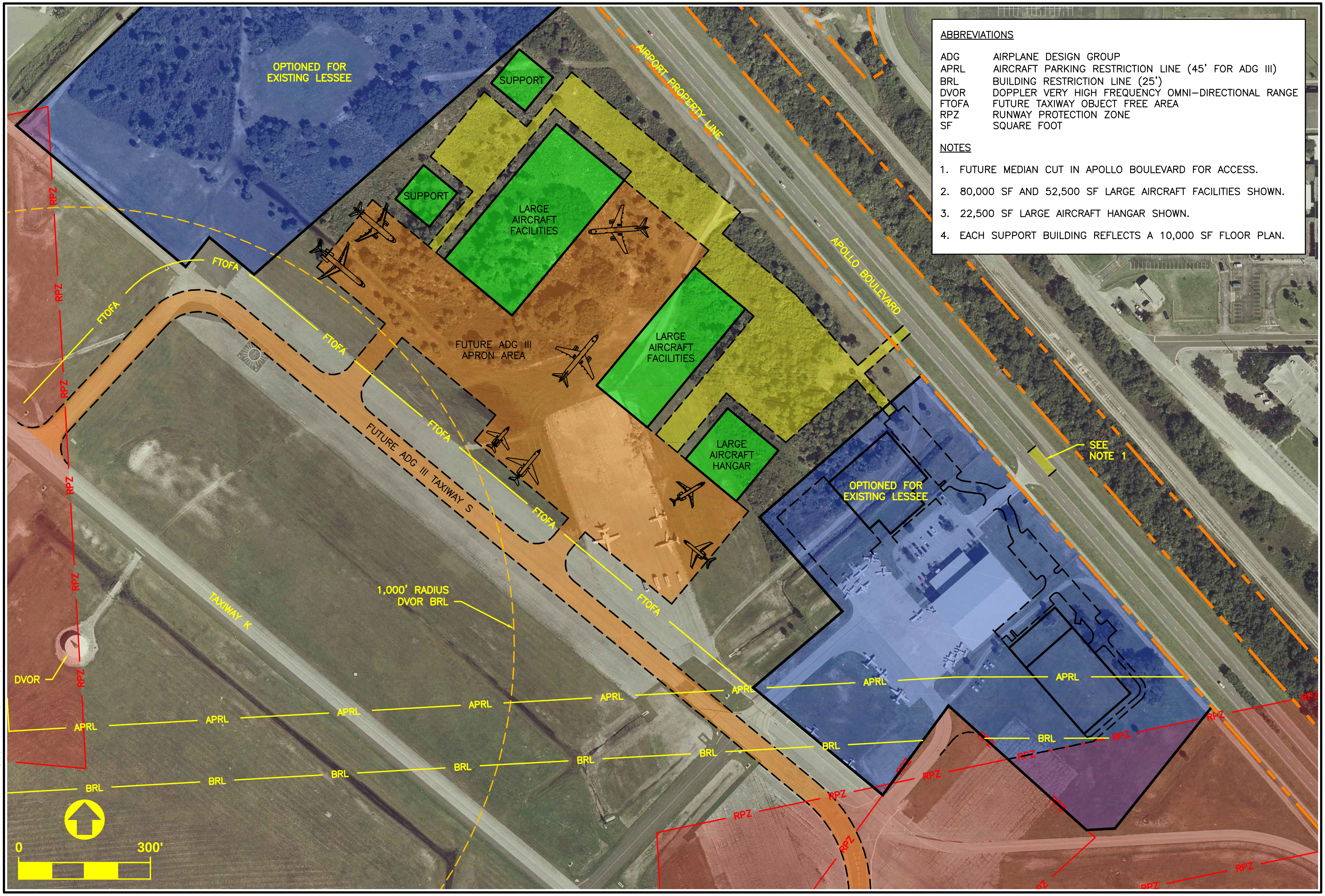
Attributes for Proposed Facility	Site A	Site B	Site C	Site D	Site E	Site F
Airside Access for ADG III Aircraft	3	4	3	1	n/a	n/a
Landside Access	5	4	3	2	n/a	n/a
Compatibility with Adjacent Uses	5	4	5	5	n/a	n/a
Impact to Existing Facilities	1	3	5	2	n/a	n/a
Flexibility of Facility Configuration	2	2	5	5	n/a	n/a
Potential Environmental Impact	5	3	5	4	n/a	n/a
Total	**21**	**20**	**26**	**19**	**n/a**	**n/a**

NOTE: Attributes for each site individually ranked 1-5 with 5 being the best.

SOURCE: ESA, 2016.

As shown, Sites C and A ranked the highest. Sites E and F were excluded due to lack of space. Concepts depicting different sized facilities to support large aircraft operations were developed for Site C (**Figure 6-12**) and Site A (**Figure 6-13**). However, neither Site C nor Site A could provide the total amount of additional apron space identified for general aviation operations by the end of the planning period. The future space was calculated based on the needs for all general aviation users and would therefore include the apron areas provided by other developments, such as the current expansion plans of Apex Executive Jet Center (formerly Baer Air). As noted before, these concepts were created to include as much development flexibility for the given site. This is particularly true for the layout on Figure 6-13, which also includes some landside uses for Site A.

Depending on which type of facilities are needed, portions of both Sites C and A should be reserved for the development of large aircraft facilities. Due to the availability of space, Site C would be better suited to accommodate a maintenance or manufacturing complex, while Site A has the proper characteristics to support FBO type facilities to serve itinerant aircraft operations.



ABBREVIATIONS

ADG	AIRPLANE DESIGN GROUP
APRL	AIRCRAFT PARKING RESTRICTION LINE (45' FOR ADG III)
BRL	BUILDING RESTRICTION LINE (25')
DVOR	DOPPLER VERY HIGH FREQUENCY OMNI-DIRECTIONAL RANGE
FTOFA	FUTURE TAXIWAY OBJECT FREE AREA
RPZ	RUNWAY PROTECTION ZONE
SF	SQUARE FOOT

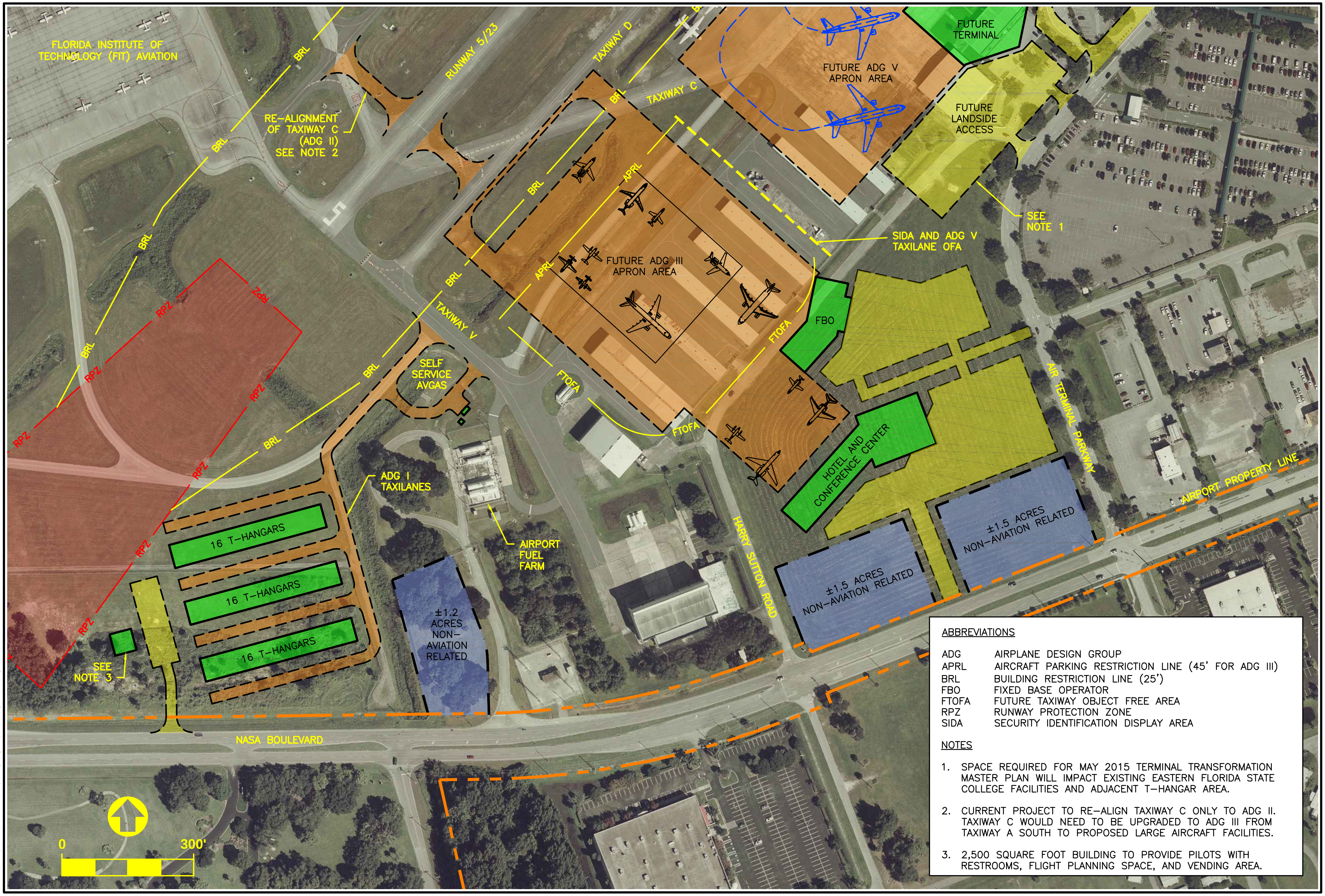
NOTES

1. FUTURE MEDIAN CUT IN APOLLO BOULEVARD FOR ACCESS.
2. 80,000 SF AND 52,500 SF LARGE AIRCRAFT FACILITIES SHOWN.
3. 22,500 SF LARGE AIRCRAFT HANGAR SHOWN.
4. EACH SUPPORT BUILDING REFLECTS A 10,000 SF FLOOR PLAN.

Source: ESA, 2016.

FIGURE 6-12

CONCEPT 2 - NORTHEAST APRON AREA



Source: ESA, 2016.

FIGURE 6-13

CONCEPT 1 - WEST APRON AREA

6.6.4 Eastern Florida State College Facilities

In the spring of 2016, a conceptual layout was presented to MLB Management for the replacement and expansion of the Eastern Florida State College (EFSC) educational facilities that are located adjacent to the passenger terminal building.[2] This plan included a new 35,000 square foot aircraft maintenance hangar, 28,000 square feet of classroom space, and 100 automobile parking spaces. In addition, the new facility would include apron space for ADG I and ADG III aircraft on opposite sides of the maintenance hangar. These facilities were proposed to be situated along Harry Sutton Road, to the southwest of the existing EFSC facilities, in the area currently occupied by T-hangar buildings.

A review of the conceptual plan found the expansion of MLB's passenger terminal building, as shown in the TTMP, would require use of a majority of the proposed site. This is due to the space needed to accommodate the larger international aircraft fleet mix included to develop the improvements shown in Figure 6-5. Therefore, it was determined the conceptual layout conflicted with planned passenger terminal improvements. However, the conceptual plan was utilized to evaluate other sites at MLB that may be suitable for the development of new aviation related educational facilities.

An evaluation of the sites was made based on the criteria shown in **Table 6-4**. Each site was individually assessed using common attributes associated with the proposed and similar facilities. This took into consideration providing a classroom building, automobile parking and landside access, and the ability to accommodate a large aircraft maintenance hangar with dual access, including the ability to accommodate ADG III aircraft.

TABLE 6-4
POTENTIAL SITES FOR NEW EASTERN FLORIDA STATE COLLEGE FACILITIES

Attributes for Proposed Facility	Site A	Site B	Site C	Site D	Site E	Site F
Airside Access for ADG III Aircraft	2	5	3	1	n/a	n/a
Landside Access	5	4	3	3	n/a	n/a
Compatibility with Adjacent Uses	1	5	4	4	n/a	n/a
Impact to Existing Facilities	1	3	5	2	n/a	n/a
Flexibility of Facility Configuration	3	3	5	5	n/a	n/a
Potential Environmental Impact	5	4	5	4	n/a	n/a
Total	**17**	**24**	**<u>25</u>**	**19**	**n/a**	**n/a**

NOTE: Attributes for each site individually ranked 1-5 with 5 being the best.

SOURCE: ESA, 2016.

2 The conceptual plan was developed by FIT Aviation students in conjunction with a class project and does not necessarily reflect the views and development plans of EFSC or FIT Aviation. The MAA supports the growth and expansion of aviation related educational facilities at MLB and requested the evaluation of the conceptual plan to ensure needs for of these type facilities were considered in the Master Plan update.

A shown in Table 6-4, Sites C and B ranked the highest. Both Sites E and F were excluded for lack of space. The conceptual layout was included as part of Figure 6-10 to depict the facility at Site C and **Figure 6-14** for Site B.

While Site C had the highest ranking, it was not the preferred site for development of aviation related education facilities. As shown in different evaluation tables, Site C ranked the highest for each of the proposed developments. This is simply due to the fact that it possesses a great amount of readily developable space, direct airfield access, direct landside access, and no known environmental concerns. Perhaps the biggest drawback for Site C is the long taxi distance to the west ends of the parallel runways. Despite this, it was largely agreed during the different meetings and workshops that Site C was best suited to support the development of other large aircraft facilities, including those for future all-cargo carrier operations. The Central Apron area (Site B) was the preferred site for this type of facility and it would be located on the airfield in proximity to other aviation related education facilities. However, the location may result in restricted engine run-ups during those times when the ATCT is operational.

6.6.5 T-Hangar Facilities

As documented in the facility requirements chapter, T-hangar demand at MLB is expected to continue through the 20-year planning period. However, due to the existing availability of T-hangar units on the north side of the airfield, this demand will be primarily limited to the replacement of existing T-hangar facilities and the development of new T-hangar buildings, on an as-needed basis. Initially this replacement is expected for the 48 units located on the south side of the airfield due to their condition and that two of these buildings are within the space required for the planned expansion of the passenger terminal building. Similarly, some T-hangar buildings on the north side of the airfield may need to be relocated to support long term airfield development options.

An evaluation of the sites available for new T-hangar facilities was made based on the criteria shown in **Table 6-5**. Each site was individually assessed using common attributes associated with aviation facility development. For the near-term need, this took into consideration the ability to provide a minimum of 48 replacement units with the proper airfield access, adequate automobile parking spaces, and landside access.

Jan 07, 2017 – 8:11am C:\Users\ddicarlo\Documents\MLB\Drawings\Figures\MLB MP Figure 6-14.dwg

Source: ESA, 2016.

FIGURE 6-14

CONCEPT 2 - CENTRAL APRON AREA

TABLE 6-5
POTENTIAL T-HANGAR DEVELOPMENT SITES

Attributes for Proposed Facility	Site A	Site B	Site C	Site D	Site E	Site F
Airside Access	5	5	5	1	n/a	4
Landside Access	5	4	3	3	n/a	4
Compatibility with Adjacent Uses	2	5	4	5	n/a	5
Impact to Existing Facilities	3	5	5	3	n/a	5
Flexibility of Facility Configuration	2	3	5	5	n/a	1
Potential Environmental Impact	5	4	5	4	n/a	5
Total	**22**	**26**	**<u>27</u>**	**21**	**n/a**	**24**

NOTE: Attributes for each site individually ranked 1-5 with 5 being the best.

SOURCE: ESA, 2016.

While Site C had the highest ranking, no T-hangar units have been considered for the Northeast Apron area. As noted previously, Site C ranked the highest for each of the proposed developments; however, it was largely agreed during the different meetings and workshops that the Northeast Apron area was best suited to support the development of large aircraft facilities, including those for future all-cargo carrier operations. Site E was excluded as it is not a compatible area for small aircraft operations. Therefore, a concept for the development of T-hangars at Site B has been included in **Figure 6-15**, while Figure 6-13 reflects the ability to construct 48 replacement T-hangar units at Site F. Additionally, while the current south T-hangar area (Site A) ranked the lowest, **Figure 6-16** illustrates this redevelopment option in detail.

Each site includes the potential to establish a self-service Avgas facility. This is in direct response to the request of the general aviation tenants and users to augment the limited FBO services on the south side of the airfield. Space has also been reserved at each for a 2,500 square foot building which could provide pilots with restrooms, flight planning, and vending area space.

Using larger T-hangar buildings, the current 48 units could be replaced at the same site along with six additional box hangar units. However, existing hangars would have to be demolished before construction on any single new building could begin. This makes Site A undesirable from a phasing standpoint and the impact it would have on existing tenants. Site B offers a location that would not have any impacts on existing tenants; however, this is also the preferred site for the eventual relocation of EFSC's facilities. Therefore, Site F is the preferred location on the south side of the airfield that should be preserved for the eventual replacement of the 48 T-hangar units.

ABBREVIATIONS

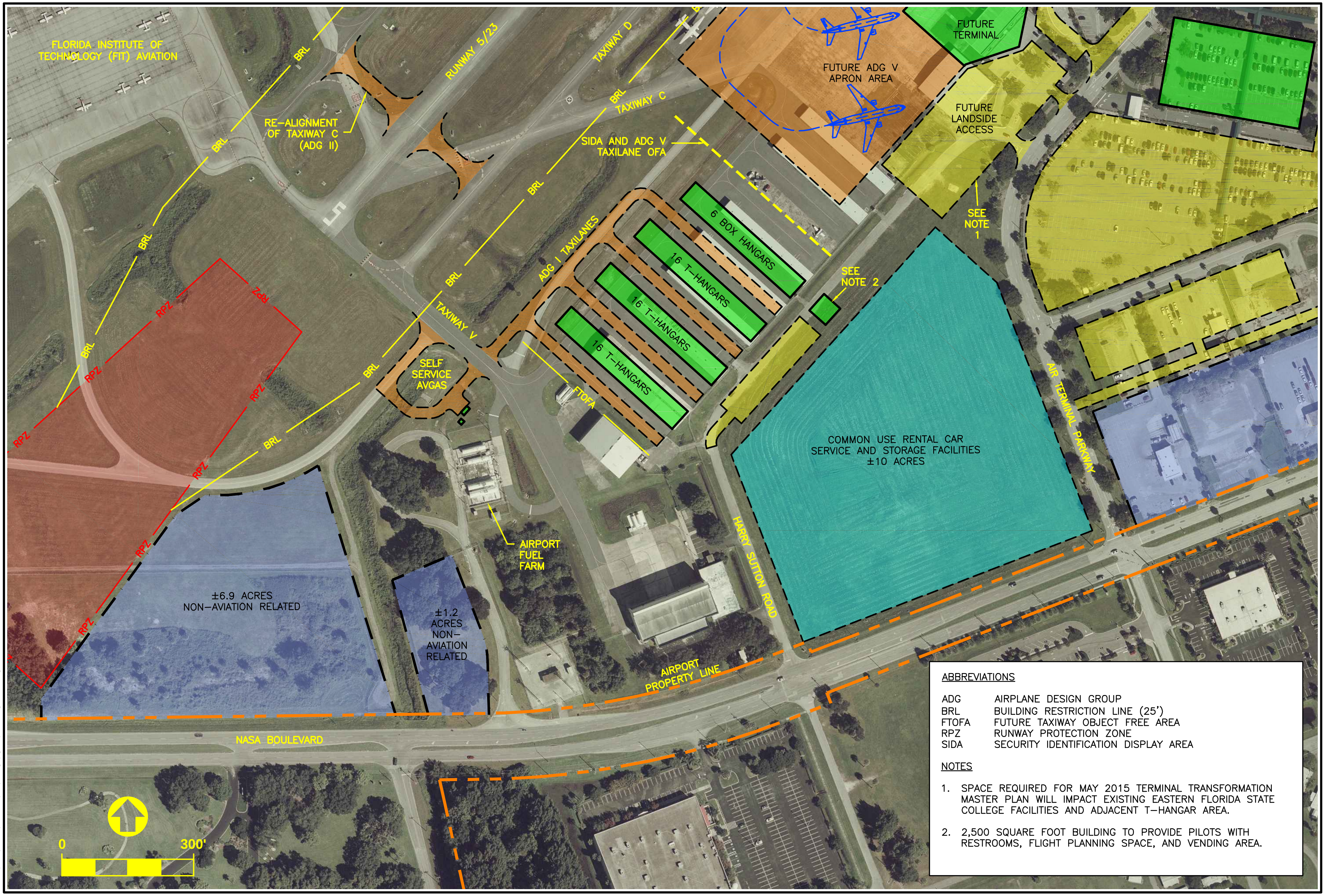
ADG	AIRPLANE DESIGN GROUP
ARFF	AIRCRAFT RESCUE AND FIRE FIGHTING
ATCT	AIRPORT TRAFFIC CONTROL TOWER
BRL	BUILDING RESTRICTION LINE (25')
FLOS	FUTURE ATCT LINE-OF-SIGHT
FTOFA	FUTURE TAXIWAY OBJECT FREE AREA

NOTES

1. 2,500 SQUARE FOOT BUILDING TO PROVIDE PILOTS WITH RESTROOMS, FLIGHT PLANNING SPACE, AND VENDING AREA.
2. PAVED AREA FOR OPERATIONS VEHICLES, MAINTENANCE EQUIPMENT, ABOVE GROUND FUEL TANKS, AND WASH RACK.

Source: ESA, 2016.

FIGURE 6-15
CONCEPT 3 - CENTRAL APRON AREA



Source: ESA, 2016.

FIGURE 6-16

CONCEPT 2 - WEST APRON AREA

6.7 Recommended Airfield Development Plan

The following describes how the preferred concepts were modified to create the overall recommended airfield development plan. The order in which they are presented follows the decisions made from the information and evaluations described in the previous sections. These will be combined with the recommended runway, taxiway system, and passenger terminal area improvements to create the overall airfield development plan. A few remaining facility requirements, such as a public heliport or additional aviation fuel storage are not included. It is assumed that such facilities would be developed based on a business decision by a tenant wanting to meet the associated demand.

6.7.1 Northeast Apron Area

An adjustment was made in the layout of proposed facilities in the Northeast Apron to accommodate the all-cargo carrier facilities, as well as the development of other large aircraft hangars, apron areas, and support structures. The proposed improvements also included a second median cut on Apollo Boulevard at the north end of the site. When combined with the median cut planned as part of the Apex Executive Jet Center improvements, this would facilitate landside access for all future tenants, including the full development of the areas optioned to existing tenants.

The relocation and widening of Taxiway S as shown for the Northeast Apron would impact the airport's compass calibration pad along the current non-movement area apron taxilane in this area. A site to accommodate a new compass calibration pad between the parallel runways, just west of Taxiway C has been reserved. This more centralized and much larger site would allow the manufacturing, MRO, and other operators of aircraft up to ADG III to maneuver in and out of the area (under their own power) for magnetic compass checks.

6.7.2 West Apron Area

While the Northeast Apron area provides the most suitable site for the development of large aircraft facilities, it alone cannot accommodate the future apron space identified in the facility requirements. As noted previously, it is assumed that both large and small general aviation aircraft facilities contribute to this need. Therefore, since the West Apron area of Site A also had some distinct advantages, it too should be preserved with Site C for the development of additional large aircraft facilities, particularly as they may be required for more traditional FBO type services for transient aircraft operations. Given its proximity to the passenger terminal building, this includes convenient access to customs and immigration services for international flights arriving to or departing from this area. It also possesses the ability to directly serve future non-aviation related development off NASA Boulevard.

6.7.3 Central Apron Area

The Central Apron area has been reserved to eventually accommodate the development of additional aviation related educational facilities as this is one of the most compatible uses for this area. Not only would it complement the existing FIT Aviation facilities off Harry Goode Way, but its development would not be impacted by the ATCT line-of-sight limitations. A modification of

the conceptual EFSC expansion plan provided was made to better fit the site and incorporate previous stormwater management plans for this area. Two T-hangar buildings have also been included to preserve the ability to provide 24 additional units on the south side of the airfield. These have been placed on the east side of the site due to their relatively low overall height for the ATCT line-of-site and their compatibility with the other small aircraft facilities, including Taxiway V. This available space east of the proposed EFSC could also be utilized to accommodate an expansion north of the existing FIT Aviation facilities, even though no plans to expand were expressed during interview with the university's management.

6.7.4 South of Runway 5

No significant changes were made to the recommended 48 T-hangar unit development site as shown on Figure 6-13. An adjustment to the proposed automobile parking lot size was made to reflect additional spaces for the hangars and potential 2,500 square foot building for pilot services and amenities.

6.7.5 East Apron Area

The East Apron area was not selected as the preferred location for any additional facilities beyond the common-use rental car support facilities described previously and originally included in Figure 6-7. The airside of this site will continue to be developed to primarily serve the MRO facilities. For the overall airfield development plan, the lot adjacent to the East Apron has been modified to accommodate both future common-use rental car facilities as well as the most recently proposed MRO hangar additions. An expansion of the automobile parking has also been made to the east of the MRO and cargo buildings to support existing and future employees on this side of the airfield.

6.7.6 North Apron Area

Even though Site D incorporates the largest amount of undeveloped airport property, it was not selected for any of the future airport facility concepts. This is simply due to the cost required to provide the proper airside and landside access, as well as utility infrastructure and potential environmental impacts just to open the area up for development. Much of this cost would be by a private developer wanting to build aviation related facilities on this land leased from the MAA. Therefore, options for this area were considered to illustrate how additional hangars and aircraft parking apron space could be configured.

These options explored possibilities to develop new and even redevelop existing facilities on the north side of the airfield. At a minimum, Taxiway M would have to be extended north across General Aviation Drive to provide airside access into the undeveloped portion of the North Apron area. Since this would sever the landside access to the facilities at the end of General Aviation Drive, a new access road would have to be constructed before the taxiway could be extended. A different taxiway route into the area is not viable due to the number of existing hangars, and property limits. The eventual need for dual taxiways in and out of the area is also critical given the amount of developable and therefore number of aviation related facilities that could be constructed.

When presented at the different meetings and workshops, these preliminary options were unpopular given they all required some existing hangars to be relocated. For one option, the spacing required for dual ADG III taxiways would impact two box hangar and two T-hangar buildings (51 total units). The second option explored a phased redevelopment of every existing T-hangar, box hangar, and executive hangar building (173 total units). The idea behind this concept was that the larger ADG III aircraft facilities would be closer to the runway environment and the smaller aircraft facilities moved to the undeveloped space north of General Aviation Drive. This option also had the potential to significantly reduce the impacts associated with providing large aircraft taxiway access into the undeveloped area.

Given that the space immediately available for the large ADG III aircraft facilities will be preserved at other sites on the airport, a modified concept for the North Apron area was created. It combines elements from the two initial options to preserve the aviation related development potential north of General Aviation Drive. **Figure 6-17** reflects a long range development plan for general aviation facility expansion which includes locating a second ADG III taxiway west of Taxiway M. Both the extension of Taxiway M and the parallel taxiway would impact wetlands. When space north of General Aviation Drive is needed, an evaluation of the wetlands and existing hangars conditions should be made at that time. This would determine whether there would be less impacts associated with wetland mitigation versus replacing some of the hangar facilities.

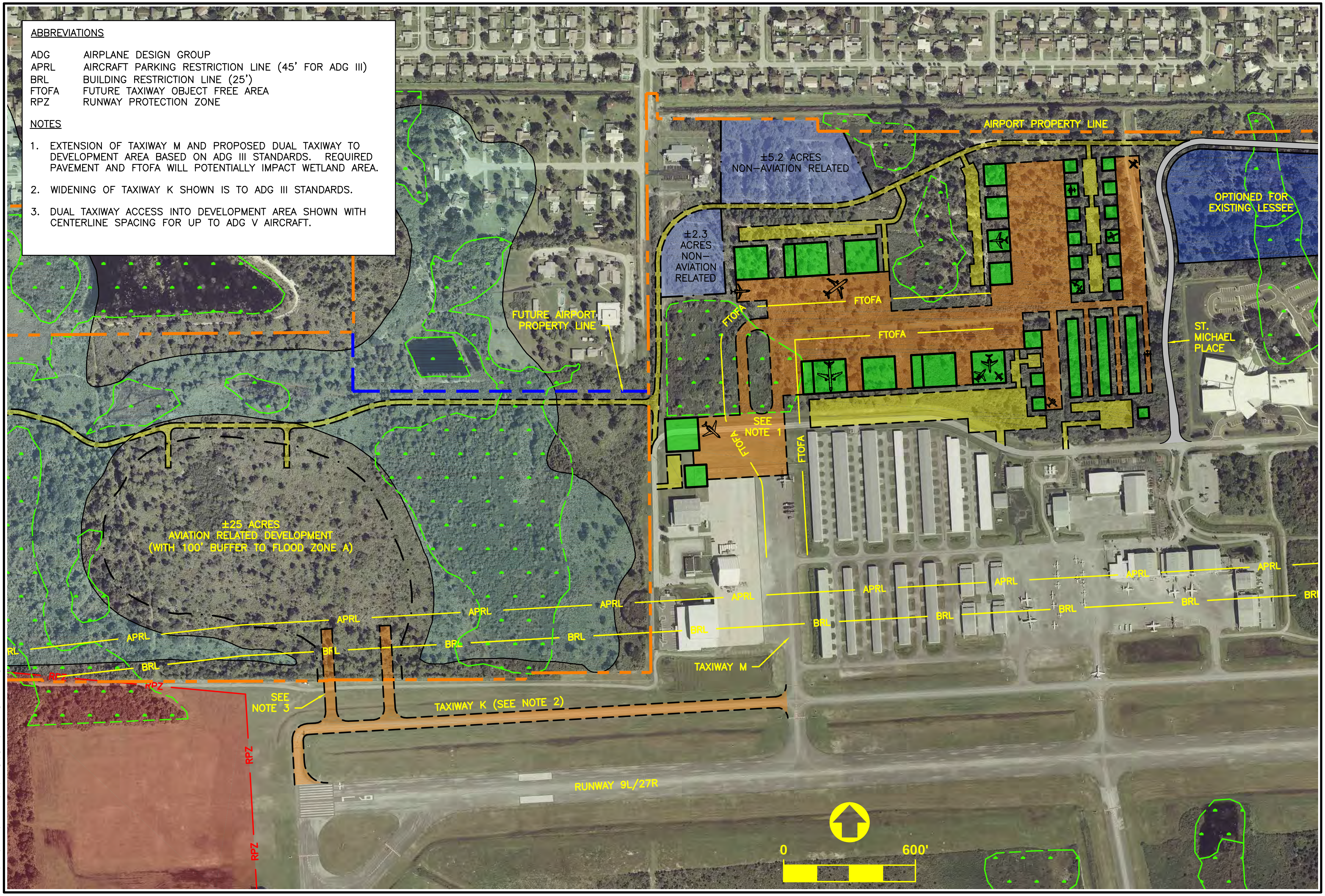
In addition to the long-term potential to develop both large and small aircraft facilities north of General Aviation Drive, Figure 6-17 depicts potential aviation related development on 195 acres of property located adjacent to the airport. While much of this land includes wetlands and floodplains, portions of the property could provide additional options for large-scale aviation development projects. Near-term acquisition of the property would prevent potential development of incompatible land uses and maintain a significant buffer area to the residential subdivision north of the airport. This proposed land acquisition is included as part of the overall airfield development plan (see **Figure 6-18**).

ABBREVIATIONS

ADG	AIRPLANE DESIGN GROUP
APRL	AIRCRAFT PARKING RESTRICTION LINE (45' FOR ADG III)
BRL	BUILDING RESTRICTION LINE (25')
FTOFA	FUTURE TAXIWAY OBJECT FREE AREA
RPZ	RUNWAY PROTECTION ZONE

NOTES

1. EXTENSION OF TAXIWAY M AND PROPOSED DUAL TAXIWAY TO DEVELOPMENT AREA BASED ON ADG III STANDARDS. REQUIRED PAVEMENT AND FTOFA WILL POTENTIALLY IMPACT WETLAND AREA.
2. WIDENING OF TAXIWAY K SHOWN IS TO ADG III STANDARDS.
3. DUAL TAXIWAY ACCESS INTO DEVELOPMENT AREA SHOWN WITH CENTERLINE SPACING FOR UP TO ADG V AIRCRAFT.



Source: ESA, 2016.

FIGURE 6-17

LONG RANGE DEVELOPMENT CONCEPT - NORTH APRON AREA

6.8 Non-Aviation Related Development Options

A number of the non-aviation related development parcels depicted with the various concepts have been carried over to the recommended airfield development plan. Based on the preferred alternative for a given site, these areas reflect those portions of airport property which have been deemed not needed for future aeronautical uses. Additionally, other non-aviation related parcels from the airport's future land use map have been included in Figure 6-18. For the most part, these parcels were identified as having potential for commercial, aerospace, and aviation research, educational, and similar development.

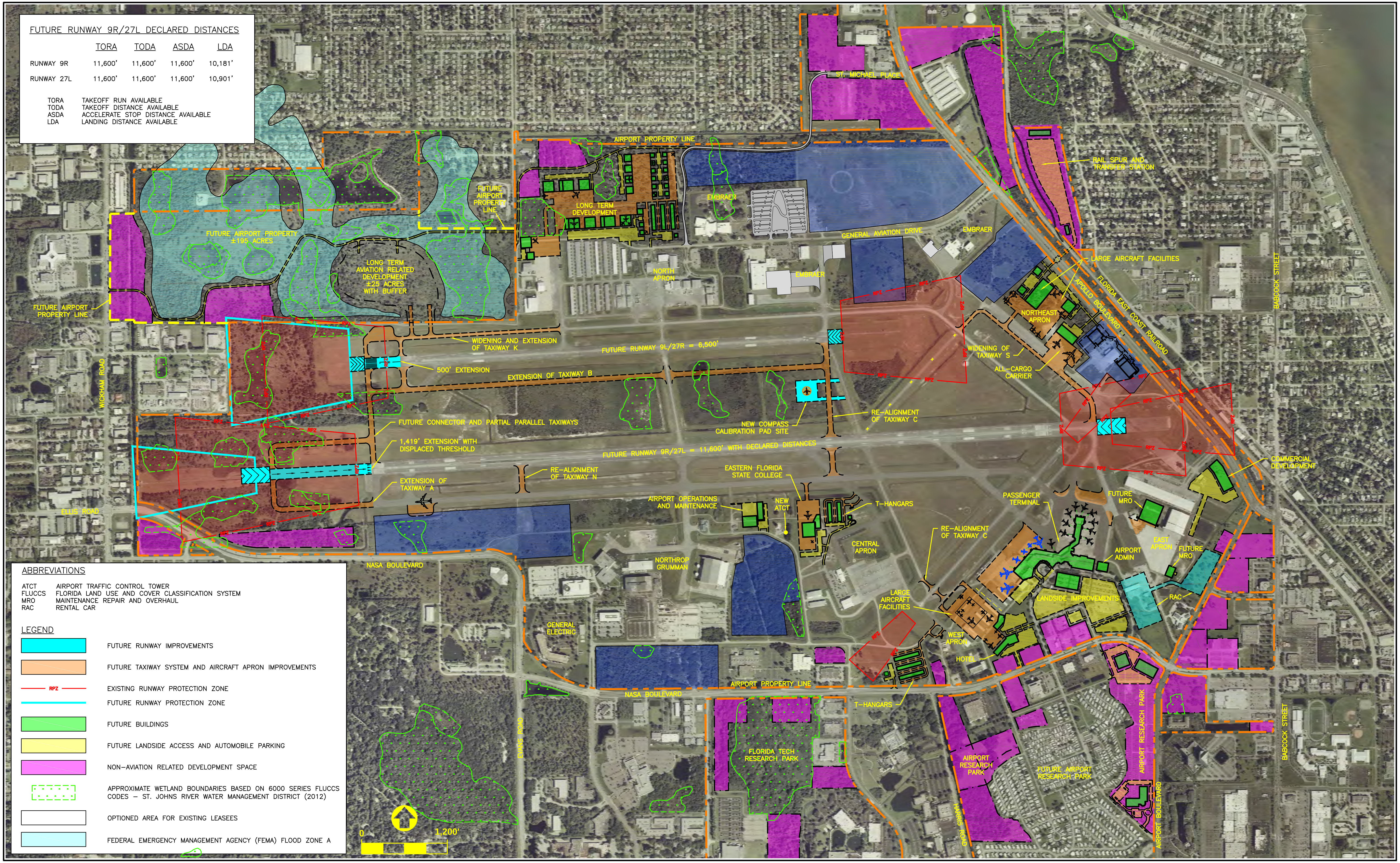
The subsequent chapter detailing the airport development program for the 20-year planning horizon includes information on the types of opportunities that may exist for developing non-aviation facilities to enhance airport revenue generation. The following sections provide a description of some of the larger non-aviation related options and the areas that should be reserved for their potential development.

6.8.1 Hotel and Conference Center

Due to the increasing number of businesses and employees at and in the immediate vicinity of MLB, a site should be reserved with the ability to develop both a hotel and conference center on-airport property. The hotel and conference center site, as shown on the West Apron area concept in Figure 6-13, has been included as part of the recommended airfield development plan. While a number of hotel configurations could be depicted, the concept shown provides a footprint of approximately 37,000 square foot. The facility envisioned would be approximately six stories tall and provide at least 130 rooms. An even taller facility could be constructed at this site as the airport imaginary surfaces allow a vertical clearance of approximately 120 feet at Harry Sutton Road. A hotel and conference center would be constructed and operated by a private company on land leased from the MAA. The ultimate facility type, size, and layout would be based on a market analysis by the developer and as approved by the MAA.

6.8.2 Airport Research Park

To the southwest of the intersection of NASA Boulevard and Airport Boulevard, an airport parcel approximately 29 acres in size is available for commercial development. This tract of land would be the first phase of the Airport Research Park. The shape and location of this parcel provides over 3,300 linear feet of road frontage. For illustrative purposes, some large commercial building footprints have been included at the north and south ends in Figure 6-18. Other available parcels south of NASA Boulevard and east of Harris Road provide additional sites for the Airport Research Park, as do the vacant airport lots east of Airport Boulevard. Ultimately, the Airport Research Park would include the entire airport parcel bounded by NASA Boulevard to the north, Hibiscus Boulevard to the south, Airport Boulevard to the east, and Harris Road to the west.



Source: ESA, 2016

Orlando Melbourne International Airport Master Plan Update - D140023

FIGURE 6-18

RECOMMENDED AIRFIELD DEVELOPMENT PLAN

6.8.3 Rail Spur and Transfer Station

In the past, inquiries have been made to the Airport Management about the accessibility to transportation facilities that could accommodate freight larger than over-the-road trucking can carry. An example would be the need to transport large wing or fuselage sections to and from MLB for aircraft manufacturing or repair. The possibility to provide a rail spur onto airport property from the FEC Railroad exists; however, to do so would require it to cross Apollo Boulevard. The rail spur and associated facilities would also take up valuable airport property adjacent to the airfield. An alternative would be to preserve the ability for a rail spur and transfer station facilities on one of the airport's vacant outparcels.

East of the intersection of Apollo Boulevard and General Aviation Drive, there are two vacant airport parcels that have frontage along the FEC Railroad. The parcel on the west side of the rail line is approximately 11.5 acres while the one to the east is approximately 20.6 acres. A potential rail spur and transfer station site has been shown on the larger parcel as it provides more depth and therefore more flexibility for the different types of facilities for such a use. While the site would require an at-grade crossing of the railroad for access to Apollo Boulevard, this would be true for any commercial development on this parcel since access would not be made through the neighborhoods to the east.

6.9 Summary of Development Alternatives

The preceding sections have identified and analyzed a number of issues related to the future development alternatives for MLB. The concepts considered for future aviation related facilities focused on meeting the 20-year requirements while maintaining the airfield's operational efficiency and safety. The resulting recommended alternatives and non-aviation related development options shown in Figure 6-18 will be utilized as the basis for the development of the new ALP drawing set and development program described in the following chapter.

CHAPTER 7

Airport Layout Plan Drawing Set

CHAPTER 7
Airport Layout Plan Drawing Set

7.1 General

This chapter describes the Airport Layout Plan (ALP) drawing set developed as part of the Master Plan update. These plans identify areas of the Orlando Melbourne International Airport (MLB) needed for aviation related development during and beyond the 20-year planning horizon, as well as the additional land available for future non-aviation revenue support. These plans also serve as a reference for airport management, the City of Melbourne, and Brevard County to evaluate existing and/or future obstruction disposition in conjunction with the Federal Aviation Administration (FAA) criteria. The ALP set presented may be amended over time to reflect changes in the airfield environment or the demand affecting future facilities.

7.2 Drawing Set

The ALP set consists of 17 separate drawings, which have been prepared using AutoCAD software to graphically depict the recommended airfield improvements, imaginary safety surfaces, and layout of future facilities. The sheets of the ALP drawing set meet the criteria established in FAA Advisory Circular (AC) 150/5070-6B, Change 2, *Airport Master Plans*; FAA ARP Standard Operating Procedure 2.0, *Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)*, the Florida Department of Transportation (FDOT) *2016 Guidebook for Airport Master Planning*, and FAA AC 150/5300-13A, Change 1, *Airport Design*.

The ALP drawing set has been prepared using the airport survey, mapping, and imagery collected at the outset of this Master Plan update as part of the FAA Airports Geographic Information System (AGIS) requirements. This digital data has been conditioned for compliance with the FAA AGIS program standards and was submitted, reviewed, and accepted by both the National Geodetic Survey (NGS) and FAA.

This drawing set includes:

- Title Sheet
- Airport Data Sheet
- Airport Layout Plan
- Terminal Area Plan
- Future CFR Part 77 Airport Surfaces (2 sheets)

- Inner Portion of the Approach Surface Drawings (5 sheets)
- Runway Centerline Profiles
- Runway 9R/27L Departure Surface Drawing
- On-Airport Land Use Plan
- Off-Airport Land Use Plan
- Exhibit “A” - Airport Property Inventory Maps (4 sheets)

The recommended development addresses the needs first identified in the assessment of the facility requirements, which were then analyzed further to arrive at a flexible plan meeting long-term airport goals. A full size version of the ALP drawing set is on file at the airport management offices as well as with both the FAA and FDOT.

7.2.1 Airport Layout Plan

The ALP graphically presents the existing and future airfield layout, key design standards, critical surfaces, and buildings, as well as the orientation of roads, structures, and other features in the immediate vicinity of the airport. Due to the various airfield facilities, including the three different runway alignments, a separate Airport Data Sheet precedes and accompanies the ALP to document the different attributes and required standards. The ALP becomes the official guidance for airport management, once approved by the FAA and the FDOT, to make decisions on the funding of airfield improvements or other requests for development on or adjacent to airport property. The airport should update this drawing, including the associated Airport Data Sheet, as needed to ensure that FAA and FDOT always have an ALP reflective of current conditions.

Most of the information presented on the ALP has been analyzed in preceding chapters, justifying the need for recommended development. This includes the need to eventually provide additional runway length to both Runway 9R/27L and Runway 9L/27R to support the larger critical aircraft expected. Therefore, the ALP reflects the overall length of Runway 9R/27L at 11,600 feet with declared distances applied and Runway 9L/27R at 6,500 feet. Improvements to the airfield’s taxiway system are also reflected to provide the necessary connectivity to the future runway improvements, correct the remaining areas that do not meet the newer FAA taxiway standards, and to provide for access into future aircraft hangar and parking areas. Additional features include the expansion of the future passenger terminal and supporting facilities; large aircraft parking area and hangars; additional fixed base operator (FBO) areas capable of handling large aircraft; new facilities for the Eastern Florida State College; and a future air cargo building and aircraft parking ramp. In addition, some features beyond the 20-year planning horizon have been included to ensure their viability in the future. This primarily includes the build out of additional general aviation hangar facilities and aircraft parking apron space on the north side of the airport.

As indicated above, the build out shown reflects more facilities than what is required over the 20-year planning period. These additional layouts offer flexibility in the airport’s continued improvement to the airport facilities. It will also decrease the need to update the ALP for individual projects. Regardless, none of the airport improvements shown will be constructed

without approval from the Melbourne Airport Authority (MAA) nor will any be allowed to create any offsite impacts with respect to drainage or water quality. Before construction, each project will also require an individual airspace analysis to protect the operational capability of the airfield. This will ensure that none of the future structures and aircraft parking areas will impact the imaginary surfaces required for the future runway or taxiway system.

7.2.2 Terminal Area Plan

The Terminal Area Plan depicts the same development configuration shown on the ALP drawing around the commercial passenger terminal at a larger scale so that additional features and greater detail of the proposed facilities can be discerned. The plan reflects the ultimate build out of the passenger terminal building and related aircraft parking positions; additional large aircraft parking and FBO facilities; the relocation of the 48 T-hangar units located adjacent to the passenger terminal area; and the improvement of various landside facilities.

The initial passenger terminal improvements include a renovation to more than half of the building envelope (106,940 of the 193,574 square feet). With the exception of most of the international terminal and airport administration offices, the renovation would include a rehabilitation of the building's roof, mechanical systems, interior facilities, and finishes. The next phase would expand the terminal to enhance both the international and domestic capabilities by approximately 50,000 square feet; however, before this can occur, 37,500 square feet of airport administration space would need to be created. This is due to the fact that first terminal expansion program from the May 2015 Terminal Transformation Master Plan (TTMP) prepared by BRPH Architects-Engineers, Inc. would utilize the current space in the terminal occupied by the airport administration offices. While the possibility exists for the office space to be accommodated on a new third floor of the terminal, a site for new airport administration office building has been reserved just to the east of the passenger terminal. This phase of the terminal program also requires the rehabilitation and expansion of the current aircraft parking apron and related taxilanes to the west airside of the terminal structure.

The following phase of terminal expansion would include a 16,000 square foot expansion of the domestic concourse to add additional gates along with the expanded apron for the aircraft parking positions and apron edge taxilane requirements. The final phase would include a 50,000 square foot expansion of the international terminal facilities, related aircraft parking apron, and apron edge taxilanes. Prior to this final phase, the current facilities adjacent to the terminal and utilized by Eastern Florida State College (EFSC) would have to be relocated. Similarly, the 48 T-hangar units on this side of the airport would have to also be relocated to the site shown to the southwest, directly off NASA Boulevard. The relocated T-hangar site includes the ability to ultimately establish a self-service Avgas facility and 2,500 square foot building to serve the tenants of these hangars.

While the future domestic and international aircraft parking positions will depend on the final terminal design, the plan does reflect the minimum setbacks required. This primarily relates to the need to be able to accommodate Airplane Design Group (ADG) IV aircraft at the domestic gates, and ADG V aircraft at the international gates. This includes consideration for the required

apron edge taxilanes and the associated tail height limitations based on the imaginary surfaces required for Runway 5/23.

The configuration of future landside facilities around the commercial terminal are also reflected on the drawing. In direct support of the passenger operations is the future parking structure to expand the number of spaces needed for both public parking as well as the rental car ready and return activity. The main surface lot and surrounding circulation roads include a reconfigured and larger cell phone lot and employee parking area, as well as access to future rental car service areas to the east of Air Terminal Parkway. On the west side of Air Terminal Parkway is the access to both the new FBO and hotel areas planned, while much of the property directly fronting NASA Boulevard has been reserved for non-aviation related development.

7.2.3 Future CFR Part 77 Airspace Surfaces

The future airspace surfaces were developed utilizing the criteria found in Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*. In order to protect the airspace and approaches to each runway from hazards that could affect the safe and efficient operation of the airport, the full extent of all airport development is utilized. The 14 CFR Part 77 criterion has been established for use by local planning and land use jurisdictions to control the height of objects in the vicinity of the airport.

The specific imaginary surfaces, which shall be protected from obstructions, include the Primary, Horizontal, Conical, Approach, and Transitional Surfaces. A description and the corresponding dimensions for each surface were included in the facility requirements chapter. The future 14 CFR Part 77 airspace surfaces must be used in conjunction with local ordinances in order for the City of Melbourne and Brevard County staff to help airport management in determining if the construction of a proposed structure will penetrate any of the protective surfaces for the airport. The height restrictions and compatible land use zoning for the area surrounding the airport are included in the following local ordinances:

- City of Melbourne, Florida Code of Ordinances: Part III – Land Development Regulations, Appendix A – Airport Zoning Ordinance (current version).
- Code of Ordinances of Brevard County, Florida Volume II – Chapter 62 Land Development Regulations, Article VI. – Zoning Regulations, Division 6. – Supplemental Regulations, Subdivision II. – Airport and Airspace Restrictions (current version).

Supplement 8 of the 2010 Comprehensive Plan for the City of Melbourne (adopted June 14, 2016) also references that the City shall implement and enforce its airport zoning regulations in order to address height, noise, clear zone, and land requirements. This is found in Objective 1.8 of Chapter III. - Transportation Element Goals, Objectives, and Policies. Objective 1.8 also includes the City’s policy to adopt the airport’s master plan.

Therefore, the updated 14 CFR Part 77 Surfaces in this ALP drawing set should be incorporated into the City of Melbourne and Brevard County ordinances, as well as adopted as part of the Comprehensive Plan for the City of Melbourne to ensure the various transportation elements and zoning regulations are up to date. Critical structures and obstructions documented in the various

data tables of the drawing sheets area based on the FAA AGIS data obtained at the onset of this Master Plan update.

7.2.4 Inner Portion of the Approach Surface Drawings

The Inner Portion of the Approach Surface Drawings illustrate in detail the critical surfaces within the approach area to each existing and future runway end. Federally obligated airports like MLB are subject to Grant Assurances 20 and 21 which require the protection of the approach surfaces. The FAA reviews all published instrument approach procedures on a periodic basis (approximately every two years). Obstacles found within the associated approach surfaces will likely result in higher minima, loss of approaches, and/or loss of night operation capability.

In addition to the applicable approach surfaces, these drawings reflect the Runway Safety Areas, Runway Object Free Areas, Runway Obstacle Free Zones, Runway Protection Zones, and Threshold Siting Surfaces, as well as the 14 CFR Part 77 Primary Surfaces and Transitional Surfaces off each runway end. Details are provided for objects that penetrate the criteria of these surfaces with existing and potential obstructions listed in the tables for each runway end. The Approach Surfaces extend out to a height of 100 feet above the respective runway threshold, as per FAA guidance for this type of drawing.

Each of these sheets also depict the location of any roadways, structures, ground elevations, and other man-made or natural features within the limits of the various imaginary surfaces. Essentially, all of the areas within these imaginary surfaces should be kept free of obstacles that could constitute a hazard to aircraft approaching or departing the airport. Since some obstructions to the various surfaces were identified, a project for 2018 has been programmed to remove and/or mark these obstructions as needed. The obstacle locations and heights were obtained from the FAA AGIS data obtained at the onset of this Master Plan update.

Following the FAA ALP checklist for developing the Inner Portion of the Approach Surface Drawings, a sixth sheet, entitled Runway Centerline Profiles, has also been included. This drawing depicts the full length of each runway centerline along with the associated Runway Safety Areas. Details include the elevations, gradients, vertical curves, and lines representing the five foot runway line-of-sight requirement.

7.2.5 Runway 9R/27L Departure Surface Drawing

The Runway Departure Surface Drawing illustrates in detail the critical surfaces within the departure area off the existing and future ends of Runway 9R/27L. Federally obligated airports like MLB are subject to Grant Assurances 20 and 21 which require the protection of the any departure surfaces established. The FAA reviews all published instrument procedures on a periodic basis (approximately every two years). Obstacles found within the associated departure surfaces will likely result in higher minima or loss of the published instrument departure procedure affected.

The drawing reflects the existing 40:1 departure surfaces off each end of Runway 9R/27L, as well as the future 40:1 departure surface that will exist off the departure end of Runway 27L, once the runway is extended 1,419 feet west. No other departure surfaces are depicted since only Runway 9R/27L has been designated as an instrument departure runway in the U.S. Terminal Procedures Publication. These departure surfaces extend 10,200 feet beyond the designated stop end of the runway, since there are no clearways established.

Details are provided for objects that penetrate the criteria of these surfaces with existing and potential obstructions listed in the table for both the existing and future surfaces. The drawing also depicts the location of any roadways, structures, ground elevations, and other man-made or natural features within the limits of the surfaces. Since some obstructions to the existing departure surfaces were identified, a project for 2018 has been programmed to remove and/or mark these obstructions as needed. The obstacle locations and heights were obtained from the FAA AGIS data obtained at the onset of this Master Plan update.

7.2.6 Land Use Plans

Land Use Plans have been prepared for both on-airport and off-airport features. While the on-airport drawing shows all of the existing airport facilities and proposed improvements, the land uses have been limited to the future uses for available airport property. This information has primarily come from the April 2017 *Future Land Use and Available Lots Map* for the airport, but has also been revised based on different elements of the Master Plan update. The on-airport drawing primarily serves to ensure that the required aviation related land is not utilized for other purposes that would limit the future airport facility improvements.

The off-airport drawing reflects the existing and future land use designations that surround the current airport property boundary. The land use codes were obtained from the Florida Geo Data Library which included 2012 mapping from the St. Johns River Water Management District for the existing designations. The future land use data was obtained from the 2011 mapping provided by the East Central Florida Regional Planning Council. Superimposed over the airport and to the surrounding area are the Day-Night Average Sound Level (DNL) noise contours created as part of the 2016 14 CFR Part 150 Noise and Land Use Compatibility Study update conducted by the airport. While the existing (2016) and future (2021) condition contours shown extend beyond the limits of the off-airport drawing, it does reflect the entire 65, 70, and 75 DNL contours required by the FAA for inclusion in the Part 150 study. As noted previously in the environmental overview chapter, the 2021 DNL 65+ contours predominantly remain on-airport property, with less than two acres of compatible off-airport industrial land northwest of the airport within the DNL 65 contour.

7.2.7 Exhibit "A" - Airport Property Inventory Maps

The Exhibit "A" - Airport Property Inventory Maps accurately depicts the current airport property line, including original parcels that were released, parcels that have been acquired, easements within the property limits, etc. Additional sheets have been included to document the various legal descriptions and to provide additional property details. These drawings meet the criteria

established in FAA AC 150/5100-17, Change 6, *Land Acquisition and Relocation Assistance for Airport Improvement Program (AIP) Assisted Projects*. Specifically, the ARP SOP No. 3.00 Appendix B, *Exhibit "A" Review Checklist*.

The information from these sheets is based on the full boundary survey and title search conducted as part of this Master Plan update by Smith & Associates Surveying & Mapping, Inc. A signed copy of the full airport Exhibit "A" Property Map drawing set is on file with airport management.

CHAPTER 8

Airport Development Program

CHAPTER 8
Airport Development Program

8.1 General

The analyses conducted in the previous chapters have evaluated airport development needs based upon current and forecast aviation activity, as well as the opportunities that will exist once new areas of the airfield are opened for development. However, the key component of the master planning process is the application of strategic positioning and financial management rationale to each development item so that a responsible and effective implementation process can be assured. The schedule of proposed capital improvements resulting from the recommendations emanating from the alternatives analysis and the cost estimates for their development are presented in this chapter. The Orlando Melbourne International Airport (MLB) is operated by the Melbourne Airport Authority (MAA) as an independent enterprise activity on behalf of the City of Melbourne. As with most airports, the expectation is that MLB should be financially self-sufficient, with the ability to cover all operating expenses as well as to provide funds for the capital projects necessary to maintain and improve facilities. The proposed airport development program identifies the airport's ability to fund capital projects proposed in the Master Plan update using the sources of funding available. Consequently, the timing of the improvement projects proposed for MLB has been structured to support these goals.

8.2 Sources of Funding for Improvements

The proposed development program has been evaluated from a variety of perspectives, including timing and financial requirements. Traditionally, airport projects are not dependent solely on the airport resources for funding, but rely on a variety of available development grants and financial resources. The predominant funding sources are described in the following sections.

8.2.1 Federal Aviation Administration

At the federal level, the Federal Aviation Administration (FAA) manages the Airport Improvement Program (AIP). Since 1982, the FAA's AIP has provided grants-in-aid for eligible airport planning and development projects. AIP funds are generated exclusively through taxes on airline tickets, fuel sales, cargo waybills, and other fees on aviation users. These funds are distributed under appropriations set by Congress to all airports in the U.S. which are considered significant to the national air transportation system and thus considered eligible for development grants. For MLB, AIP grants are offered to provide up to 90 percent of the funding for eligible projects.

AIP Entitlement funds are distributed to commercial service airports as an annual allocation based on the airport's number of enplaned passengers. The entitlements are calculated through a graduated scale. The official passenger boarding data collected by the FAA for a full calendar year (CY) determines the entitlements for the next full fiscal year (FY). In other words, CY 2015 enplanement data determines the FY 2017 entitlement funds. Airports do not necessarily need to use all of their entitlements in a given year, but can carry over these funds to future years.

AIP Discretionary funds are distributed to airports based on specific projects that have been determined to rate high in a national priority ranking (NPR) system. High national priorities include enhancing safety, security, and capacity in addition to reconstruction of existing facilities. The AIP Discretionary funds are distributed on a priority basis, which is established by each FAA Regional Office based upon the number and dollar amount of grant applications received. MLB competes for discretionary grant funds with other airports in the region, as well as the entire country.

Like most commercial service airports, MLB has consistently received and used AIP Entitlement funds over the years. For MLB, the history of federally funded projects has been exclusively with AIP Entitlements. The current 2017 capital budget for MLB includes the project to rehabilitate Runway 9R/27L, which will be funded in part with AIP Discretionary funds. These are the first AIP Discretionary funds for MLB in over 20 years, with the exception of a small damage relief grant for the 2004 hurricane season.

Assuming that AIP continues in its current form, the airport can expect a total of nearly $23.4 million in Entitlement funds over the next ten years. This figure is based on the actual CY 2015 enplanements for the FY 2017 entitlement amounts, and projecting the actual enplanements forward using the average annual growth rate of 5.5 percent from the approved enplanements forecast for this study. **Table 8-1** reflects the anticipated AIP Entitlement funding, along with the leveraged Florida Department of Transportation (FDOT) and sponsor (MLB) shares, for the short and intermediate-term planning periods. Access to AIP Discretionary funds is expected to continue based on the NPR of specific projects.

TABLE 8-1
ANTICIPATED FAA AIRPORT IMPROVEMENT PROGRAM ENTITLEMENT FUNDS FOR MLB

Fiscal Year	FAA Entitlements	FDOT[a]	Local[a]	Total Funding
Short-Term (2018 – 2022)				
2018	1,989,076	110,504	110,504	2,210,084
2019	2,055,575	114,199	114,199	2,283,972
2020	2,125,732	118,096	118,096	2,361,924
2021	2,199,747	122,208	122,208	2,444,163
2022	2,277,833	126,546	126,546	2,530,926
Total	**$10,647,963**	**$591,554**	**$591,554**	**$11,831,070**
Intermediate-Term (2023 – 2027)				
2023	2,360,214	131,123	131,123	2,622,460
2024	2,447,126	135,951	135,951	2,719,029
2025	2,538,818	141,045	141,045	2,820,909
2026	2,635,553	146,420	146,420	2,928,392
2027	2,737,608	152,089	152,089	3,041,787
Total	**$12,719,318**	**$706,629**	**$706,629**	**$14,132,576**

[a] Assumes FDOT matching sponsor share at 5 percent.

SOURCE: Quadrex, 2017.

8.2.2 Florida Department of Transportation

Each year the Florida Department of Transportation (FDOT) Aviation and Spaceports Office manages an aviation work program of state grants for planning, design, construction, and other projects. State funding is generally available for matching the sponsor's share of federal projects which usually represents 5 percent of federal projects funded at 90 percent. FDOT also provides funding for airport development projects that could otherwise be eligible for federal funds or for other projects considered important for supporting the state's system of airports. For commercial service airports like MLB, FDOT funding is limited to 50 percent of total project costs. There are several MLB projects that are candidates for FDOT stand-alone funding.

FDOT also manages the state's Strategic Intermodal System (SIS) fund, which provides project grants up to 50 percent. MLB is currently designated as an "emerging" SIS airport and is therefore eligible to receive grants from the program. Emerging SIS airports are expected to meet the full SIS criteria, as defined by FDOT, in the foreseeable future. The type of projects that qualify for SIS funding include capacity improvement projects meeting the requirements of the ground transportation, landside connection, airside connection, and terminal connection categories.

8.2.3 Passenger Facility Charges

Congress has authorized the collection of Passenger Facility Charges (PFCs) to assist airports in generating local funds for projects that will (1) preserve or enhance airport safety, security, or capacity; (2) reduce aircraft noise; or (3) enhance airline competition. Since PFCs are local funds, the projects funded solely using PFCs are not bound by federal procurement requirements other than being depicted on an approved Airport Layout Plan (ALP). Airlines collect and remit a maximum $4.50 PFC for each revenue passenger for specific projects approved by the FAA. PFC funds can be used on a pay-as-you-go basis, or can be collected and held until adequate funds are in place to implement the project(s). PFCs can also be dedicated as the primary source for debt-service payments of bonds or loans used to finance projects. Similar to AIP Entitlements, the PFCs for MLB can also be projected based on forecast passenger enplanements as shown in **Table 8-2**.

TABLE 8-2
ANTICIPATED PASSENGER FACILITY CHARGES FOR MLB

Fiscal Year		Projected PFC Revenues[a]
Short-Term (2018 – 2022)		
2018		1,020,739
2019		1,076,880
2020		1,136,108
2021		1,198,594
2022		1,264,517
	Total	**$5,696,838**
Intermediate-Term (2023 – 2027)		
2023		1,334,065
2024		1,407,439
2025		1,484,848
2026		1,566,515
2027		1,652,673
	Total	**$7,445,540**

[a] Net $4.39 PFC Revenue ($4.50 less airline compensation).

SOURCE: Quadrex, 2017.

PFC authorizations are limited by the FAA to either the amount to be collected and used or the expected expiration date, whichever comes first. Currently, $2.2 million in PFC funds have been collected for MLB from a total amount of $2.8 million as part of PFC Application No. 7. At the present rate of collections, the balance of the authorization will be reached in late 2017.

8.2.4 Customer Facility Charges

Customer Facility Charges (CFC) are a potential revenue source generally used for funding projects serving the airport's rental car activities. These can include the common-use rental car facilities, rental car ready and return spaces, and the associated access roads. CFCs are collected by each rental car company and based on a per-rental transaction or more commonly, rental days. Since most rental car related projects are too big to be funded on a pay-as-you-go basis, CFCs are generally used to provide the primary revenue source for debt service on bonds that finance development.

The current rental car service areas at MLB are planned to be relocated to a new location and it is possible that CFCs could be used to fund the planning and development of the relocation. As documented in the facility requirements chapter, the rental car demand analysis conducted as part of this Master Plan update included the recommendation that the airport engage the rental car agencies at the airport with the goal of starting a CFC as soon as possible.

8.2.5 Operational Revenue Surpluses

Surplus revenues can be used to provide capital for the airport's matching share of a grant project. A review of MLB's historical operating revenues and expenses for FY 2011-2016 indicated the airport operated at a deficit early in the period but has gained substantial revenues for subsequent years. The rate of growth in operating surpluses is anticipated to increase during the short-term planning period. The use of cash surpluses from operations to fund capital projects is unrestricted but in most cases, the last resort for providing project funding.

MAA also maintains a capital reserve fund that can be utilized to finance projects either as airport only projects or for bridge financing where project reimbursements fall short.

8.3 Airport Development Program

The initial step in establishing an airport development program is to determine the cost of each proposed improvement. Cost data used in this study was collected from a variety of sources, including actual project estimates, published engineering indices, government agencies, and similar airport construction projects in the area. In addition, consideration was given to reflect costs related to testing, survey, inspection, and other unknown contingencies. Estimates for each planning period are based on 2017 dollars.

The recommended developments of the Capital Improvement Program (CIP) are divided into the current projects (2016 – 2017) and three planning periods which include the short-term (2018 - 2022), intermediate-term (2023 - 2027), and long-term (2028 - 2037). These periods, shown in **Table 8-3**, differ from those presented in the aviation activity forecasts, due to the time required to complete the various portions of this study and the grant cycles of the funding agencies. Regardless, a number of the projects are based on demand and may need to be either moved up or delayed depending on when certain planning activity levels or thresholds are expected to be met. This is particularly true for those projects beyond the initial five year planning period.

TABLE 8-3
SUMMARY OF DEVELOPMENT PROGRAM COSTS
(COSTS IN 2017 MILLIONS OF DOLLARS)

Development Program Period		Estimated Costs	Local Share
Current Projects (2016 – 2017)		51.4	14.4
Short-Term (2018 – 2022)		64.5	27.5
Intermediate-Term (2023 – 2027)		120.5	50.9
Long-Term (2028 – 2037)		229.4	80.7
	Total	**$465.8**	**$173.5**

SOURCE: ESA, 2017.

Descriptions of the improvements for each CIP period are included in the following sections and illustrated in **Figures 8-1** to **8-3** at the end of the chapter. Also included is a section which details airport improvement projects that are either currently underway or have already been funded prior to 2018.

The tables associated with the CIP represent the culmination of comparative analyses among basic budget factors, need or demand, and priority assignments. Development costs were split based on previous funding experiences for similar projects. The proposed funding sources from FAA and FDOT are dependent on availability and other factors and are not guaranteed. They should be viewed simply potential sources used as part of the financial feasibility and phasing of the various projects.

The information in **Tables 8-4** and **8-5** reflect the current projects in the airport's current Joint Automated Capital Improvement Program (JACIP), while those in **Tables 8-6** and **8-7** will be used for the annual updates of JACIP. The JACIP is a secure, internet-based program, which allows the agencies and airport management to interact on a real time basis as different funding needs and issues evolve. When the JACIP is updated, the appropriate annual increases should be applied to the 2017 cost estimates in order to ensure that the funding agencies program realistic budgets for each planned project. A spreadsheet referencing historic inflation rates over the past five years has been provided to the airport for this purpose.

8.3.1 Current Projects

A number of airport improvement projects are currently in progress with the expectation of either being completed by the end of 2017 or early 2018. The one exception is the new hangar, while the grant offer has been received, the project has not started. The current projects, which are listed in Table 8-4 and shown on Figure 8-1, include:

8.3.1.1 Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.1

A 2016 grant initiated the first phase of the May 2015 Terminal Transformation Master Plan (TTMP) prepared by BRPH Architects-Engineers, Inc. to rehabilitate more than half of the existing passenger terminal building (106,940 of the 193,574 square feet). Due to the scope and

costs associated with the rehabilitation, Phase 1 has been broken out into a number of smaller sub-phases. Phase 1.1 primarily includes improvements to the Federal Inspection Services (FIS)/U.S. Customs and Border Protection (CBP) facilities on the first level, the domestic concourse bathrooms, replacing passenger boarding bridge #2, and replacing one of three chillers.

8.3.1.2 Rehabilitate Runway 9L/27R and Taxiway B

The project to rehabilitate the north parallel runway (Runway 9L/27R) and Taxiway B began in 2016 with construction set for the second half of 2017. Once the rehabilitation of Runway 9L/27R has been completed, the overall fair condition documented in the 2015 FDOT pavement evaluation will be improved. It will also serve to ensure that the pavement strength can accommodate the future critical aircraft (Boeing 737) at 174,200 pounds with a dual landing gear configuration. This will also allow the runway to be used temporarily as the primary runway, including all commercial service carrier activity, so that Runway 9R/27L can be rehabilitated. The Runway 9L/27R rehabilitation improvements include upgrading the edge lighting systems to LEDs as well as to provide for standard paved proper shoulders.

8.3.1.3 Rehabilitate Runway 9R/27L

Runway 9R/27L has not been resurfaced since 1998 and the 2015 FDOT pavement evaluations also documented it with an overall fair condition; however, some portions were very close to the poor condition rating. The design for the full rehabilitation of Runway 9R/27L began in early 2017 with construction expected later in the year once Runway 9L/27R is complete. The rehabilitation will provide a pavement strength that can accommodate the future critical aircraft (Boeing 747) at 875,000 pounds with a dual tandem landing gear configuration; upgrading the edge lighting systems and many of the guidance signs to LEDs; and the paved shoulder and blast pad areas.

8.3.1.4 Construct New Airport Traffic Control Tower

The construction of a new airport traffic control tower (ATCT) just east of the existing tower began in early 2017. The new tower will replace the current 50 year old tower that does not meet the current FAA criteria including line-of-sight issues and space in the cab that is too small for the type of equipment and operations managed by the controllers. The new ATCT will provide an eye height of 133 feet above mean sea level for the controllers and much more space. Due to its location, construction of the new ATCT will require that Runway 5/23 be temporarily closed since the new tower will create a direct line-of-sight impact to Runway 5/23 for the current tower. Because of this, the airport has decided to accelerate the project to rehabilitate Runway 5/23 (described below) to coincide with the new tower construction. The new ATCT is slated to be operational by the end of 2017.

8.3.1.5 Construct New MRO Hangar

The airport received a grant to construct a second maintenance repair and overhaul (MRO) hangar at the airport. This facility would be sized and equipped much like the existing large MRO hangar in the East Apron area. The hangar is slated to be located just to the northwest of the existing large MRO hangar as depicted on Figure 8-1.

8.3.1.6 Rehabilitate Runway 5/23 and Realign Taxiway C

As noted above, construction of the new ATCT will impact the line-of-sight for the controllers in the existing tower to Runway 5/23. For this reason, the project to rehabilitate the Runway 5/23 pavement will occur while the new tower is under construction. Included with the project is the re-alignment of Taxiway C, between Taxiways D and F, to create the proper right angle intersections with Runway 5/23. The project will also include upgrading the runway edge lighting systems and many of the guidance signs to LEDs.

8.3.1.7 Rehabilitate and Expand Fuel Farm

A project to rehabilitate and expand the existing MAA fuel farm began in 2017. This project includes the installation of two additional 50,000-gallon Jet-A tanks, rehabilitation of two existing Jet-A tanks, and the cleaning and resealing of the concrete pad and containment wall for the facility. The project increases the overall Jet-A fuel storage capacity from 100,000 gallons to 200,000 gallons.

In addition to the above listed project, there have been a number of new and expanded private facilities at the airport during 2016 and 2017. These have included Embraer, Northrop Grumman, STS Repair and Modification (formerly Aeromod), Apex Executive Jet Center (formerly Baer Air), and Satcom Direct, most of which have been reflected on the ALP drawing set as the as-built drawings became available.

8.3.2 Short-Term Capital Improvement Program

The improvements planned from 2018 to 2022 are listed in Table 8-5 and included on Figure 8-1. A number of these short-term projects focus on the continued rehabilitation of the passenger terminal building (Phase 1 of the TTMP). In 2018 TTMP Phase 1.2 includes the FIS on the second level, the second of three chillers, and additional equipment replacement. TTMP Phase 1.3 in 2019 is a design build project to replace the remaining five domestic concourse passenger boarding bridges. That same year, TTMP Phases 1.4 and 1.5 will be designed. The construction of these next two phases will occur in 2020 and 2021 with a focus on the final domestic concourse renovations. The last two projects in the short-term include the design and construction (2021 and 2022) for new airport administration office space. This project must be completed before Phase 2 of the TTMP can begin, since the current administrative space will be converted to different uses under that phase of the program.

To support the airport's continuous effort to maintain and improve the airfield facilities, specific projects have been programmed for that objective. In 2018, an obstruction removal and marking project is included to remove as many of the obstructions documented through the FAA Airports Geographic Information System (AGIS) data obtained as part of this study. For structures that cannot be removed (such as hangar buildings) the project will include obstruction lighting. In 2019 a design build project is proposed to complete the final phase of widening Taxiway K while 2021 and 2022 include projects to realign Taxiways N and V. Taxiways N and V do not meet the newer FAA taxiway design criteria portion and are proposed to be realigned between Runway 9R/27L and Taxiway A. In 2019, plans will be prepared to improve the current airfield lighting

vault with climate control equipment, insulation, and improvements to the electrical and mechanical systems of the structure. The vault improvements are programmed to occur in 2020. At the end of the short-term, plans will also be prepared to rehabilitate several smaller taxiway sections as a comprehensive improvement project which will include an airport signage plan to analyze the potential need to rename the existing taxiways to better adhere to the current FAA taxiway nomenclature convention.

Five projects are included to significantly improve both the secured airfield and public access around the airport's property. In 2019, plans will be prepared to rehabilitate the interior patrol road. The subsequent construction in 2020 will stabilize approximately 29,500 linear feet of the existing single lane interior patrol road following the same path/alignment with minor modifications to better support the larger Aircraft Rescue and Fire Fighting (ARFF) vehicles that also use the road. The design phase to construct three new airport connector roads will occur in 2020 with the first phase of construction set for 2021. Phase 1 will extend the existing access off of Apollo Boulevard serving Apex Executive Jet Center to the northwest and include a second median cut on Apollo Boulevard at the north end of the road. When combined with the median cut planned as part of the Apex facility improvements, this would provide the landside access necessary for all future Northeast Apron Area tenants. Improved access from Aerospace Drive to the facilities located off of the East Apron area also slated for Phase 1. The second phase set for 2022 would extend a road west and then south off of the recently constructed extension of St. Michael Place on the north side of the airport. The future development of the north side of the airfield requires, at a minimum, that Taxiway M be extended north across General Aviation Drive to provide airside access into the undeveloped area. Since this would sever the landside access to the facilities at the end of General Aviation Drive, the new connector needs to be constructed before the taxiway can be extended.

The other projects programmed for the short-term include the FAA reimbursement of funds associated with moving the ATCT equipment from the old tower to the new structure in 2018. In both 2019 and 2020, projects to replace the airport's perimeter security system equipment will also include the acquisition of a new police vehicle. The last two projects included in 2022 are to acquire a new ARFF vehicle and to purchase approximately 195 acres of land on the northwest side of the current airport property line.

8.3.3 Intermediate-Term Capital Improvement Program

As detailed in Table 8-6 and shown on Figure 8-2, many of the projects during the intermediate-term planning period center on continuing to improve the passenger terminal, its support facilities, and the other uses in the immediate area surrounding the terminal building. In 2023, design of the final phases to rehabilitate the terminal building will be conducted. The final renovations to the interior of the terminal will be accomplished over two years of construction with TTMP Phase 1.6 in 2024 and TTMP Phase 1.7 in 2025. Afterwards, the design for Phase 2.1 of the TTMP will be conducted in 2026. The first of three phases, TTMP Phase 2.1 will begin the 50,000 square foot expansion of the international terminal concourse facilities, including providing connectivity with the domestic facilities. The initial expansion phase will begin in 2027.

In 2023 the project to rehabilitate approximately 17,600 square yards of the terminal apron has been programmed. As shown on Figure 8-2, this portion of the apron will need to be rehabilitated and somewhat reconfigured, in order to support the expansion associated with Phase 2 of the TTMP. On the landside, a design build project in 2023 will provide a new cell phone parking lot of at least 35 spaces and a new 200 space employee parking. The following year (2024), the planning, environmental, and design will begin for the construction of a parking garage capable of accommodating approximately 1,200 spaces in front of the passenger terminal building. The parking structure reflected on Figure 8-2 is programmed for construction in 2025 to include six levels with space on the lower deck(s) allocated for the rental car ready and return use.

The intermediate planning period also has projects that are necessary to enable future passenger terminal area improvements. This includes the relocation of facilities on both sides of the existing terminal building, beginning with the design of 48 new T-hangar units in 2023 to replace those located off of Harry Sutton Road, west of the passenger terminal. Construction of the new T-hangars and associated taxilanes would occur in 2025 at the site located between Runway 5 and NASA Boulevard. In 2024 a design build project has been programmed to relocate and expand the airport’s operations and maintenance facilities, currently located east of the passenger terminal. The new site just east of the airfield lighting vault would provide a 30,000 square foot building for storage and enclosed equipment parking; a 20,000 square foot building containing space for a machine shop, five bay fleet maintenance area, and office space; vehicle parking lot and truck delivery area; a paved ramp for maintenance equipment operations; a dedicated fuel farm; and a wash rack. The existing operations and maintenance facilities will be demolished to make way for the first phase of the future common use rental car service and storage facilities. The final enabling project in 2027 is for the design of the new Eastern Florida State College (EFSC) facilities for the site just east of the new ATCT. The current EFSC facilities need to be relocated in order for the expansion of the international passenger terminal concourse included in TTMP Phase 3. At this time the relocation is planned for funding with grants where private investment would cover at least half of the project cost.

Airfield improvements between 2023 and 2027 include a project to rehabilitate taxiway pavements (those not included as separate improvement projects); the design and construction of Taxiway J; and the re-alignment and widening of Taxiway S. The Taxiway J project will connect the ends of Runway 9R and Runway 9L. The realignment and widening of Taxiway S in 2026 would allow it to accommodate both the anticipated Airplane Design Group (ADG) III aircraft and ADG V aircraft for the future facilities envisioned for the Northeast Apron area. However, this re-alignment will impact the existing compass calibration pad on this side of the airport. As noted for the recommended airfield development plan, a much larger compass calibration pad site has been reserved between the parallel runways, just west of Taxiway C. Because this more centralized site is envisioned to serve up to ADG III aircraft for the manufacturing and MRO operators, as well as others, it will likely be funded privately and may occur before the existing compass calibration pad is impacted. In addition, the costs associated with its construction will vary significantly depending on the final size required and whether it is constructed before or after the proposed re-alignment of Taxiway C. For these reasons, no formal compass calibration

pad project is included in the airport's CIP. Another project in 2026 is to rehabilitate approximately 40,000 square yards of the existing North Apron area aircraft parking ramp.

The intermediate-term also includes projects for the design (2024) and construction (2026) of a new hangar facility for Elite Airways. This hangar and its associated facilities are envisioned to be in the Northeast Apron area and would be funded by grants that include private investment that matches the local share. Two additional projects in 2027 that would include private investment have been included to construct a new fixed base operator (FBO) in the West Apron area. The FBO terminal would be approximately 30,000 square feet and include a rehabilitated apron of approximately 46,800 square yards on the western half of the current 48 unit T-hangar site. The remaining projects for this planning period include the acquisition of a new runway pavement sweeper in 2023 and a new master plan study in 2024.

8.3.4 Long-Term Capital Improvement Program

As listed in Table 8-7 and reflected on Figure 8-3 there are a number of projects included over the ten-year course of the long-term planning period. Many of these projects support the continued expansion of the passenger terminal building and its related facilities. At the onset of the long-term period, this includes the completion of TTMP Phase 2 and ends with the ultimate TTMP Phase 3 terminal build out. Both the domestic and international terminal expansion plans include the corresponding aircraft parking apron and terminal taxilanes to accommodate the expected commercial passenger aircraft fleet mix. On the landside, improvement projects include the two phases to construct the future common use rental car service and storage facilities. The estimates associated with these facilities include surface lots with approximately 12,000 square feet of single story buildings in Phase 1 and additional surface lot space with another 9,000 square feet of building space in Phase 2. The buildings are envisioned to include the necessary bays for the servicing of the rental car fleet, as well as administration, restrooms, and storage type space. Towards the end of the planning period there is also a rehabilitation of the public parking surface lot for the passenger terminal building.

For the airfield, this period includes the planning, environmental, design, and construction projects to extend Runway 9R/27L and Runway 9L/27R to the west, as well as their associated parallel taxiways. The projects necessary to construct a full length parallel (Taxiway B) on the south side of Runway 9L/27R, re-align Taxiway C, and a partial parallel on the north side of Runway 9R/27L are also included. Another key airfield project is the extension of Taxiway M to open up the aviation related development space on the north side of the airport. Projects have also been provided to rehabilitate different taxiway pavements, aircraft parking aprons, and towards the end of the 20-year planning horizon, all three runway surfaces.

Additional projects have been included to expand existing and construct new aviation related facilities as well as some intermodal facilities on the east side of Apollo Boulevard. There are projects to provide the planning, environmental, design, and construction phases of the northwest airport connector road. This would provide the roadway necessary to access the approximate 195 acres of land to be acquired during the short-term planning period.

8.4 Summary

While the 20-year development program is aggressive, all of the projects are necessary for the continued maintenance and successful development of the airport. MLB serves as an important transportation element and economic engine for the area. For this reason, it should be noted that the build out shown on Figure 8-3, as well as the various sheets of the ALP drawing set, reflect more facilities than those included in the 20-year CIP. These provide flexibility in the future improvements of the airport while also decreasing the need to update the ALP for individual development projects.

TABLE 8-4
CURRENT PROJECTS (2016 – 2017)

Year	Project		Total	FAA Entitlement	FAA Discretionary	FDOT	Airport General Fund	Airport PFC
2016	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.1		6,222,995	4,209,047	-	233,835	498,432	1,281,681
2016	Rehabilitate Runway 9L/27R and Taxiway B		3,768,565	-	-	1,884,283	-	1,884,283
		Subtotal for 2016	**$9,991,560**	**$4,209,047**	**-**	**$2,118,118**	**$498,432**	**$3,165,964**
2017	Rehabilitate Runway 9R/27L		22,294,693	1,800,000	18,265,223	1,067,035	1,162,435	-
2017	Construct New Airport Traffic Control Tower		7,104,224	-	-	3,552,112	-	3,552,112
2017	Construct New MRO Hangar		10,000,000	-	-	5,000,000	5,000,000	-
2017	Rehabilitate Runway 5/23 and Realign Taxiway C		952,540	-	-	476,270	-	476,270
2017	Rehabilitate and Expand Fuel Farm		1,021,330	-	-	510,665	510,665	-
		Subtotal for 2017	**$41,372,787**	**$1,800,000**	**$18,265,223**	**$10,606,082**	**$6,673,100**	**$4,028,382**
		TOTAL	**$51,364,347**	**$6,009,047**	**$18,265,223**	**$12,724,200**	**$7,171,532**	**$7,194,346**

SOURCE: ESA, 2017.

TABLE 8-5
SHORT-TERM (2018 – 2022) CAPITAL IMPROVEMENT PROGRAM

Year	Project	Total	FAA Entitlement	FAA Discretionary	FDOT	Airport General Fund	Airport PFC
		Estimates (in 2017 dollars)					
2018	Obstruction Removal and Marking	1,000,000	900,000	-	50,000	-	50,000
2018	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.2	4,000,000	-	-	2,000,000	500,000	1,500,000
2018	Airport Traffic Control Tower - FAA Reimbursement	500,000	-	-	250,000	-	250,000
	Subtotal for 2018	**$5,500,000**	**$900,000**	**$0**	**$2,300,000**	**$500,000**	**$1,800,000**
2019	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.3	5,500,000	4,950,000	-	275,000	-	275,000
2019	Replace Security System and Police Vehicle – (Part 1 of 2)	500,000	-	450,000	25,000	-	25,000
2019	Prepare Plans and Specifications - Modify Airfield Lighting Vault	180,000	-	162,000	9,000	-	9,000
2019	Prepare Plans and Specifications - Rehabilitate Interior Patrol Road	200,000	180,000	-	10,000	-	10,000
2019	Prepare Plans & Specifications - Rehabilitate Terminal TTMP Phases 1.4 & 1.5	3,000,000	-	-	1,500,000	375,000	1,125,000
2019	Widening of Taxiway K (west of Taxiway M) – Final Phase	1,500,000	-	-	750,000	750,000	-
	Subtotal for 2019	**$10,880,000**	**$5,130,000**	**$612,000**	**$2,569,000**	**$1,125,000**	**$1,444,000**
2020	Replace Security System and Police Vehicle – (Part 2 of 2)	3,500,000	-	3,150,000	175,000	-	175,000
2020	Modify Airfield Lighting Vault	1,745,000	-	1,570,500	87,250	-	87,250
2020	Rehabilitate Interior Patrol Road (±29,500 LF)	2,000,000	-	1,800,000	100,000	-	100,000
2020	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.4	4,000,000	-	-	2,000,000	500,000	1,500,000
2020	Prepare Plans and Specifications - Airport Connector Roads	500,000	-	-	250,000	250,000	-
	Subtotal for 2020	**$11,745,000**	**$0**	**$6,520,500**	**$2,612,250**	**$750,000**	**$1,862,250**
2021	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.5	7,000,000	6,300,000	-	350,000	-	350,000
2021	Prepare Plans and Specifications - Realign Runway 9R/27L Connectors	500,000	-	450,000	25,000	-	25,000
2021	Prepare Plans and Specifications - Airport Administration Offices (37,500 SF)	1,397,000	-	-	698,500	698,500	-
2021	Construct New Airport Connector Roads - Phase 1	1,500,000	-	-	750,000	750,000	-
	Subtotal for 2021	**$10,397,000**	**$6,300,000**	**$450,000**	**$1,823,500**	**$1,448,500**	**$375,000**
2022	Realign Runway 9R/27L Connectors (Taxiways N and V)	4,500,000	-	4,050,000	225,000	-	225,000
2022	Acquire ARFF Vehicle	900,000	-	810,000	45,000	-	45,000
2022	Prepare Plans and Specifications - Rehabilitate Taxiway Pavements	200,000	-	180,000	10,000	-	10,000
2022	Construct New Airport Connector Roads - Phase 2	2,000,000	-	-	1,000,000	1,000,000	-
2022	Construct Airport Administration Offices (37,500 SF)	15,367,000	-	-	-	15,367,000	-
2022	Acquire ±195 Acres of Land	3,000,000	-	-	1,500,000	1,500,000	-
	Subtotal for 2022	**$25,967,000**	**$0**	**$5,040,000**	**$2,780,000**	**$17,867,000**	**$280,000**
	SHORT-TERM TOTAL	**$64,489,000**	**$12,330,000**	**$12,622,500**	**$12,084,750**	**$21,690,500**	**$5,761,250**

SOURCE: ESA, 2017.

TABLE 8-6
INTERMEDIATE-TERM (2023 – 2027) CAPITAL IMPROVEMENT PROGRAM

Year	Project	Total	FAA Entitlement	FAA Discretionary	FDOT	Airport General Fund	Airport PFC
		Estimates (in 2017 dollars)					
2023	Rehabilitate Taxiway Pavements	2,000,000	-	1,800,000	100,000	100,000	-
2023	Acquire Runway Sweeper	250,000	-	225,000	12,500	12,500	-
2023	Prepare Plans and Specifications – Rehab. Terminal TTMP Phases 1.6 and 1.7	1,100,000	-	-	550,000	550,000	-
2023	Rehabilitate Terminal Apron (±17,600 SY)	5,381,640	-	-	2,690,820	-	2,690,820
2023	Prepare Plans and Specifications - 48 New T-Hangar Units (South Side)	400,000	-	-	200,000	200,000	-
2023	Construct New Cell Phone and Employee Parking Lots for Terminal	1,648,680	-	-	824,340	824,340	-
	Subtotal for 2023	**$10,780,320**	**$0**	**$2,025,000**	**$4,377,660**	**$1,686,840**	**$2,690,820**
2024	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.6	5,500,000	4,950,000	-	275,000	-	275,000
2024	Master Plan	1,000,000	-	900,000	50,000	50,000	-
2024	Environmental, Prepare Plans, and Specifications - New Parking Garage	2,508,000	-	-	1,254,000	1,254,000	-
2024	Prepare Plans and Specifications - New Hangar (Elite)	500,000	-	-	250,000	250,000*	-
2024	Construct 50,000 SF Airport Operations and Maintenance Facilities	13,359,720	-	-	6,679,860	6,679,860	-
	Subtotal for 2024	**$22,867,720**	**$4,950,000**	**$900,000**	**$8,508,860**	**$8,233,860**	**$275,000**
2025	Rehabilitate Terminal (106,940 SF) - TTMP Phase 1.7	5,500,000	-	-	2,750,000	687,500	2,062,500
2025	Construct New Parking Garage	27,588,000	-	-	13,794,000	13,794,000	-
2025	Construct 48 New T-Hangar Units (South Side)	7,000,000	-	-	3,500,000	3,500,000	-
2025	Construct New Hangar (Elite)	5,000,000	-	-	2,500,000	2,500,000*	-
	Subtotal for 2025	**$45,088,000**	**$0**	**-**	**$22,544,000**	**$20,481,500**	**$2,062,500**
2026	Environmental, Prepare Plans, and Specifications - Taxiway J	449,200	-	404,280	22,460	22,460	-
2026	Prepare Plans and Specifications - Expand Terminal Building - TTMP Phase 2.1	750,000	-	-	375,000	375,000	-
2026	Re-Align and Widen Taxiway S	5,274,720	-	-	2,637,360	2,637,360	-
2026	Rehabilitate North Apron (±40,000 SY)	3,945,480	-	-	1,972,740	1,972,740	-
	Subtotal for 2026	**$10,419,400**	**$0**	**$404,280**	**$5,007,560**	**$5,007,560**	**$0**
2027	Expand Terminal Building (50,000 SF) - TTMP Phase 2.1	7,500,000	6,750,000	-	375,000	-	375,000
2027	Construct New Taxiway J	4,041,200	-	3,637,080	202,060	202,060	-
2027	Prepare Plans and Specifications - New EFSC Facility	1,918,180	-	-	959,090	959,090*	-
2027	Construct New West Apron FBO Ramp (±46,800 SY)	5,782,920	-	-	2,891,460	2,891,460*	-
2027	Construct New West Apron FBO Terminal (±30,000 SF) and Parking Lot	12,134,760	-	-	6,067,380	6,067,380*	-
	Subtotal for 2027	**$31,377,060**	**$6,750,000**	**$3,637,080**	**$10,494,990**	**$10,119,990**	**$375,000**
	INTERMEDIATE-TERM TOTAL	**$120,532,500**	**$11,700,000**	**$6,966,360**	**$50,933,070**	**$45,529,750**	**$5,403,320**

*Airport portion to be split 50/50 with private entity.

SOURCE: ESA, 2017.

TABLE 8-7
LONG-TERM (2028 – 2037) CAPITAL IMPROVEMENT PROGRAM

		Estimates (in 2017 dollars)					
Year	**Project**	**Total**	**FAA Entitlement**	**FAA Discretionary**	**FDOT**	**Airport General Fund**	**Airport PFC**
2028	Prepare Plans and Specifications - Expand Terminal Building - TTMP Phase 2.2	700,000	-	-	350,000	350,000	-
2028	Construct New EFSC Facility	21,099,980	-	-	10,549,990	10,549,990*	-
2028	Environmental Assessment - Northwest Airport Connector Road	300,000	-	-	150,000	150,000	-
2028	Construct New Air Cargo Facility (37,500 SF) and Apron (±18,500 SY)	20,060,040	-	-	10,030,020	10,030,020	-
2028	Construct Self Service Avgas Area and Pilot Building (2,500 SF)	1,077,120	-	-	538,560	538,560	-
2029	Expand Terminal Building (50,000 SF) - TTMP Phase 2.2	7,000,000	6,300,000	-	350,000	350,000	-
2029	Re-Alignment of Taxiway C	4,233,240	3,809,916	-	211,662	211,662	-
2029	Environmental Assessment - Extend Runway 9L/27R	250,000	-	-	125,000	125,000	-
2029	Construct New Aircraft Hangar Area	8,607,720	-	-	4,303,860	4,303,860*	-
2030	Prepare Plans and Specifications - Expand Terminal Building - TTMP Phase 2.3	800,000	-	-	400,000	400,000	-
2030	Environmental, Prepare Plans, and Specifications - Taxiway B	1,051,160	946,044	-	52,558	52,558	-
2030	Prepare Plans and Specifications - Northwest Airport Connector Road	394,790	-	-	197,395	197,395	-
2030	Prepare Plans and Specifications - Extend Runway 9L/27R	634,810	-	-	317,405	317,405	-
2030	Environmental, Prepare Plans, and Specifications - Extend Taxiway M	419,720	-	-	209,860	209,860	-
2031	Expand Terminal Building (50,000 SF) - TTMP Phase 2.3	8,000,000	-	-	4,000,000	1,000,000	3,000,000
2031	Prepare Plans and Specifications - Expand Domestic Terminal Apron	482,020	433,818	-	24,101	24,101	-
2031	Master Plan	1,000,000	-	900,000	50,000	50,000	-
2031	Construct New Taxiway B	13,062,760	-	11,756,484	653,138	653,138	-
2031	Extend Runway 9L/27R and Taxiway K (500 feet)	6,982,910	-	-	3,491,455	3,491,455	-
2031	Construct New Northwest Airport Connector Road - Phase 1	1,646,810	-	-	823,405	823,405	-
2032	Prepare Plans and Specifications - Expand Domestic Terminal -TTMP Phase 3.0	640,000	-	-	320,000	320,000	-
2032	Expand Domestic Terminal Apron (±10,700 SY)	5,302,220	4,771,998	-	265,111	265,111	-
2032	Construct New Common Use Rental Car Facilities (±6 acres) - Phase 1	7,149,120	-	-	3,574,560	3,574,560	-
2032	Extend Taxiway M	2,966,920	-	-	1,483,460	1,483,460	-
2032	Rehabilitate Central Apron (±45,700 SY)	4,407,480	-	-	2,203,740	2,203,740	-
2032	Prepare Plans and Specification - New Multi-Modal Cargo Tran. Fac. w/ Rail Spur	410,190	-	-	205,095	205,095	-
2033	Expand Domestic Terminal (16,000 SF) - TTMP Phase 3.0	6,400,000	-	-	3,200,000	800,000	2,400,000
2033	Prepare Plans and Specifications - Expand International Terminal Apron	815,320	733,788	-	40,766	40,766	-
2033	Construct New Northwest Airport Connector Road - Phase 2	2,695,880	-	-	1,347,940	1,347,940	-
2033	Construct New Run-up Area for Taxiway A	1,793,880	-	-	896,940	896,940	-
2033	Construct New Multi-Modal Cargo Transfer Facility with Rail Spur	4,512,090	-	-	2,256,045	2,256,045	-
2034	Expand International Terminal Apron (±31,000 SY)	8,968,520	8,071,668	-	448,426	448,426	-
2034	Prepare Plans and Specifications - Expand Int'l Terminal - TTMP Phase 3.1	750,000	-	-	375,000	375,000	-
2034	Rehabilitate Taxiway Pavements	2,000,000	-	1,800,000	100,000	100,000	-
2034	Environmental, Prepare Plans, and Specifications - Extend Runway 9R/27L	1,673,860	-	1,506,474	83,693	83,693	-
2034	Construct New Common Use Rental Car Facilities (±4 acres) - Phase 2	5,629,800	-	-	2,814,900	2,814,900	-
2035	Expand International Terminal (50,000 SF) - TTMP Phase 3.1	7,500,000	-	-	3,750,000	937,500	2,812,500
2035	Rehabilitate Terminal Public Parking Lots (±51,700 SY)	3,257,760	-	-	1,628,880	1,628,880	-

TABLE 8-7
LONG-TERM (2028 – 2037) CAPITAL IMPROVEMENT PROGRAM

Year	Project	Total	FAA Entitlement	FAA Discretionary	FDOT	Airport General Fund	Airport PFC
		Estimates (in 2017 dollars)					
2035	Extend Runway 9R/27L and Taxiway A (1,419 feet)	15,962,460	-	14,366,214	798,123	798,123	-
2035	Rehabilitate Runway 9R/27L	14,000,000	-	12,600,000	700,000	700,000	-
2036	Prepare Plans and Specifications – Exp. Int'l Terminal - TTMP Phases 3.2 & 3.3	1,500,000	-	-	750,000	750,000	-
2036	Construct Partial Parallel Taxiway (north of Runway 9R/27L extension)	4,127,640	-	-	2,063,820	2,063,820	-
2036	Rehabilitate Runway 9L/27R	3,500,000	-	-	1,750,000	1,750,000	-
2036	Expand Multi-Modal Cargo Transfer Facility	9,614,880	-	-	4,807,440	4,807,440	-
2037	Expand International Terminal (50,000 SF) - TTMP Phase 3.2	7,500,000	-	-	3,750,000	937,500	2,812,500
2037	Expand International Terminal (50,000 SF) - TTMP Phase 3.3	7,500,000	-	-	3,750,000	937,500	2,812,500
2037	Rehabilitate Runway 5/23	1,000,000	-	-	500,000	500,000	-
	LONG-TERM TOTAL	**$229,381,100**	**$25,067,232**	**$42,929,172**	**$80,692,348**	**$66,854,848**	**$13,837,500**

*Airport portion to be split 50/50 with private entity.

SOURCE: ESA, 2017.

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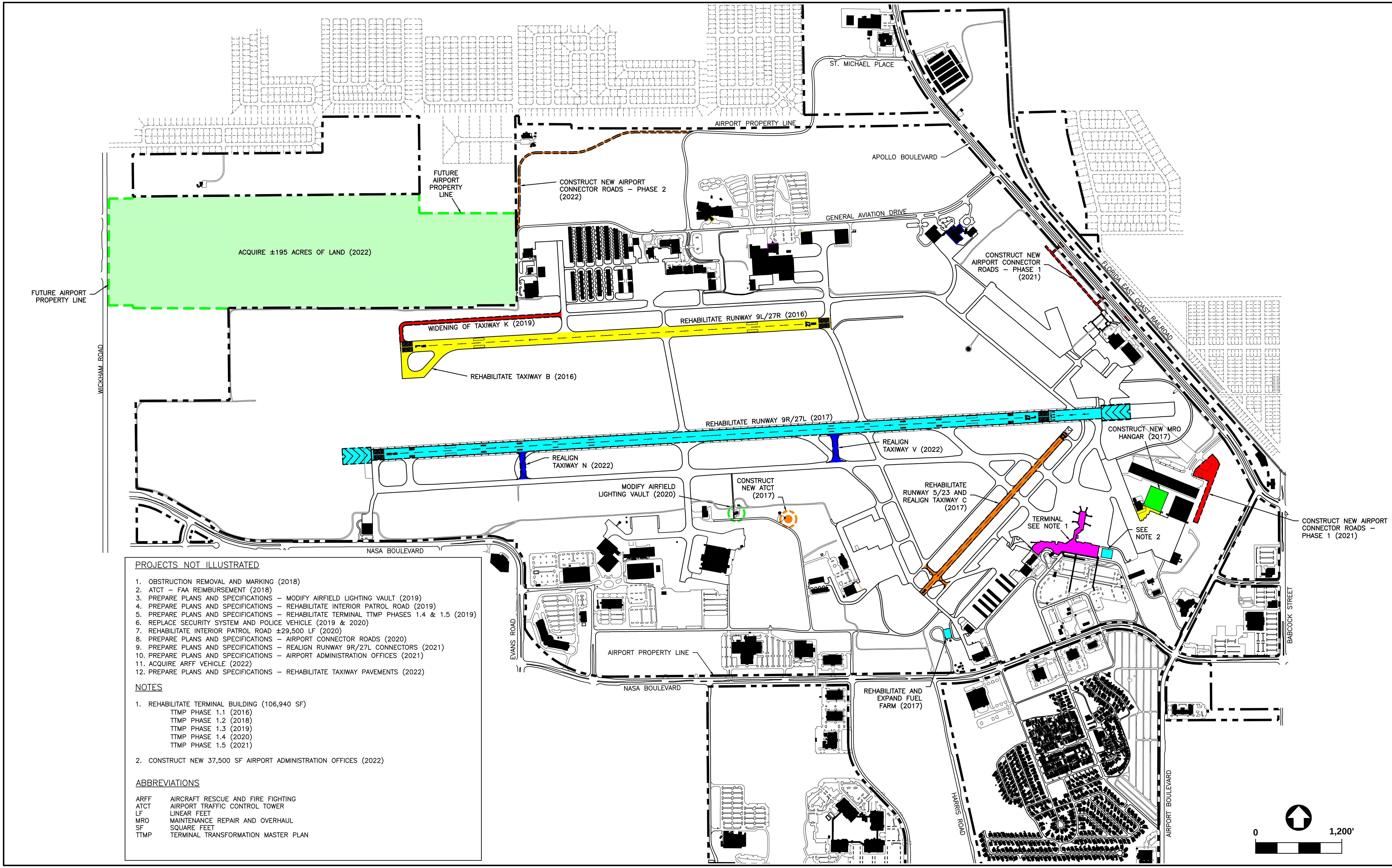
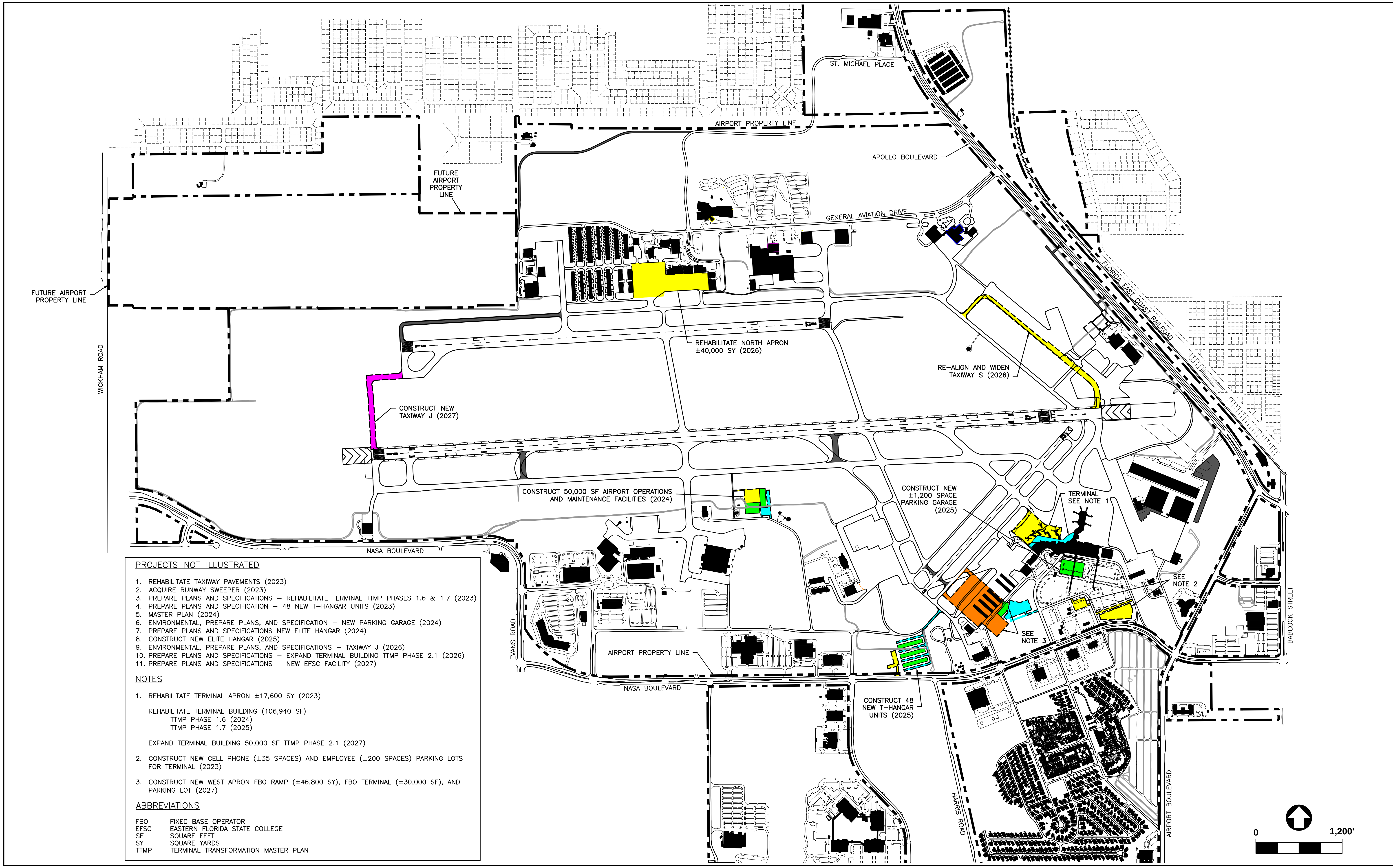


Source: ESA, 2017

Orlando Melbourne International Airport Master Plan Update - D140023

FIGURE 8-1

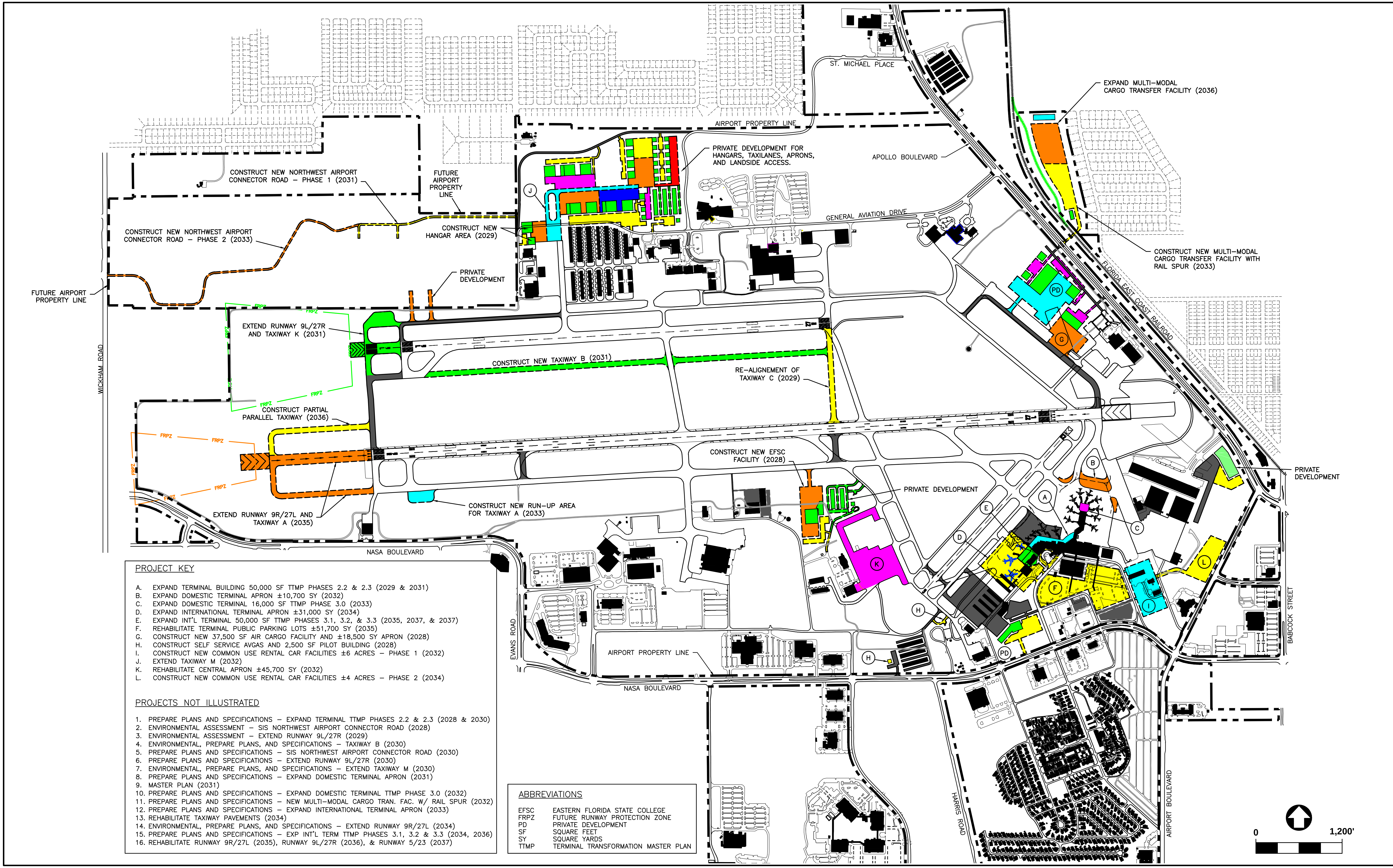
CURRENT AND SHORT-TERM (2018 - 2022) CAPITAL IMPROVEMENT PROJECTS



Source: ESA, 2017

FIGURE 8-2

INTERMEDIATE-TERM (2023 - 2027) CAPITAL IMPROVEMENT PROJECTS



PROJECT KEY

A. EXPAND TERMINAL BUILDING 50,000 SF TTMP PHASES 2.2 & 2.3 (2029 & 2031)
B. EXPAND DOMESTIC TERMINAL APRON ±10,700 SY (2032)
C. EXPAND DOMESTIC TERMINAL 16,000 SF TTMP PHASE 3.0 (2033)
D. EXPAND INTERNATIONAL TERMINAL APRON ±31,000 SY (2034)
E. EXPAND INT'L TERMINAL 50,000 SF TTMP PHASES 3.1, 3.2, & 3.3 (2035, 2037, & 2037)
F. REHABILITATE TERMINAL PUBLIC PARKING LOTS ±51,700 SY (2035)
G. CONSTRUCT NEW 37,500 SF AIR CARGO FACILITY AND ±18,500 SY APRON (2028)
H. CONSTRUCT SELF SERVICE AVGAS AND 2,500 SF PILOT BUILDING (2028)
I. CONSTRUCT NEW COMMON USE RENTAL CAR FACILITIES ±6 ACRES – PHASE 1 (2032)
J. EXTEND TAXIWAY M (2032)
K. REHABILITATE CENTRAL APRON ±45,700 SY (2032)
L. CONSTRUCT NEW COMMON USE RENTAL CAR FACILITIES ±4 ACRES – PHASE 2 (2034)

PROJECTS NOT ILLUSTRATED

1. PREPARE PLANS AND SPECIFICATIONS – EXPAND TERMINAL TTMP PHASES 2.2 & 2.3 (2028 & 2030)
2. ENVIRONMENTAL ASSESSMENT – SIS NORTHWEST AIRPORT CONNECTOR ROAD (2028)
3. ENVIRONMENTAL ASSESSMENT – EXTEND RUNWAY 9L/27R (2029)
4. ENVIRONMENTAL, PREPARE PLANS, AND SPECIFICATIONS – TAXIWAY B (2030)
5. PREPARE PLANS AND SPECIFICATIONS – SIS NORTHWEST AIRPORT CONNECTOR ROAD (2030)
6. PREPARE PLANS AND SPECIFICATIONS – EXTEND RUNWAY 9L/27R (2030)
7. ENVIRONMENTAL, PREPARE PLANS, AND SPECIFICATIONS – EXTEND TAXIWAY M (2030)
8. PREPARE PLANS AND SPECIFICATIONS – EXPAND DOMESTIC TERMINAL APRON (2031)
9. MASTER PLAN (2031)
10. PREPARE PLANS AND SPECIFICATIONS – EXPAND DOMESTIC TERMINAL TTMP PHASE 3.0 (2032)
11. PREPARE PLANS AND SPECIFICATIONS – NEW MULTI-MODAL CARGO TRAN. FAC. W/ RAIL SPUR (2032)
12. PREPARE PLANS AND SPECIFICATIONS – EXPAND INTERNATIONAL TERMINAL APRON (2033)
13. REHABILITATE TAXIWAY PAVEMENTS (2034)
14. ENVIRONMENTAL, PREPARE PLANS, AND SPECIFICATIONS – EXTEND RUNWAY 9R/27L (2034)
15. PREPARE PLANS AND SPECIFICATIONS – EXP INT'L TERM TTMP PHASES 3.1, 3.2 & 3.3 (2034, 2036)
16. REHABILITATE RUNWAY 9R/27L (2035), RUNWAY 9L/27R (2036), & RUNWAY 5/23 (2037)

ABBREVIATIONS

EFSC	EASTERN FLORIDA STATE COLLEGE
FRPZ	FUTURE RUNWAY PROTECTION ZONE
PD	PRIVATE DEVELOPMENT
SF	SQUARE FEET
SY	SQUARE YARDS
TTMP	TERMINAL TRANSFORMATION MASTER PLAN

Jul 03, 2017 – 4:00pm
C:\Users\ddicarlo\Documents\MLB\Drawings\Figures\MLB MP Figure 8-3.dwg

Source: ESA, 2017

FIGURE 8-3

LONG-TERM (2028 - 2037) CAPITAL IMPROVEMENT PROJECTS

APPENDIX A

Response to Aviation Forecast Concerns

U.S. Department
of Transportation
**Federal Aviation
Administration**

ORLANDO AIRPORTS DISTRICT OFFICE
5950 Hazeltine National Dr., Suite 400
Orlando, Florida 32822-5003
Phone: (407) 812-6331 Fax: (407) 812-6978

December 1, 2015

Mr. Greg Donovan, AAE
Executive Director
Melbourne Airport Authority
One Air Terminal Parkway
Suite 220
Melbourne, FL 32901

Dear Mr. Donovan:

RE: Melbourne International Airport, Melbourne, Florida
AIP 3-12-0156-007-2014
Approval of Airport Forecasts for Airport Master Plan Update

This letter responds to your submittal of revised Forecast of Aviation Activity for the Melbourne International Airport dated November 23, 2015. The based aircraft, enplanements and operations forecasts shown in Table 3-31 of the report are approved to be used in your on-going master planning efforts. Please note that for any future facility development, the aviation demand forecasts must be revalidated and submitted to the FAA before federal funding is approved.

If you have any questions, please feel free to contact me at (407) 812-6331, ext. 117.

Sincerely,

Marisol C. Elliott

Marisol C. Elliott
Program Manager/Community Planner

cc: Doug DiCarlo, ESA

Melbourne International Airport

Master Plan Update

Response to Aviation Forecast Concerns

November 12, 2015

Purpose of Meeting

Discuss:

1. Review Issues, Goals and Objectives
2. General Concern 1 – Potential for Growth
3. General Concern 2 – Recommended Projection
4. General Concern 3 – Florida Aviation System Plan
5. Request for Forecast Approval

Issues, Goals and Objectives

Master Plan Update Goals and Objectives

Goals

- Meet FAA's Airport Geographic Information System (AGIS) mandate.
- Update the airport's "Exhibit A" Property Map to ensure compliance with AIP grant assurances.
- Update the ALP drawing set to reflect recent development areas, proposed development, and meet current FAA requirements for ALP drawings.

Objectives

- Ensure orderly development and refine land development plans.
  - ✓ Preserve ability to accommodate long term aviation need
- Enhance customer and airport user safety, service, and experience.
  - ✓ Terminal Transformation Program
  - ✓ Direct connection to Interstate 95

The MAA is continuing to increase the number of passengers and grow international service at the airport. The Master Plan Update will consider what airport improvements may be needed to accommodate this growth.

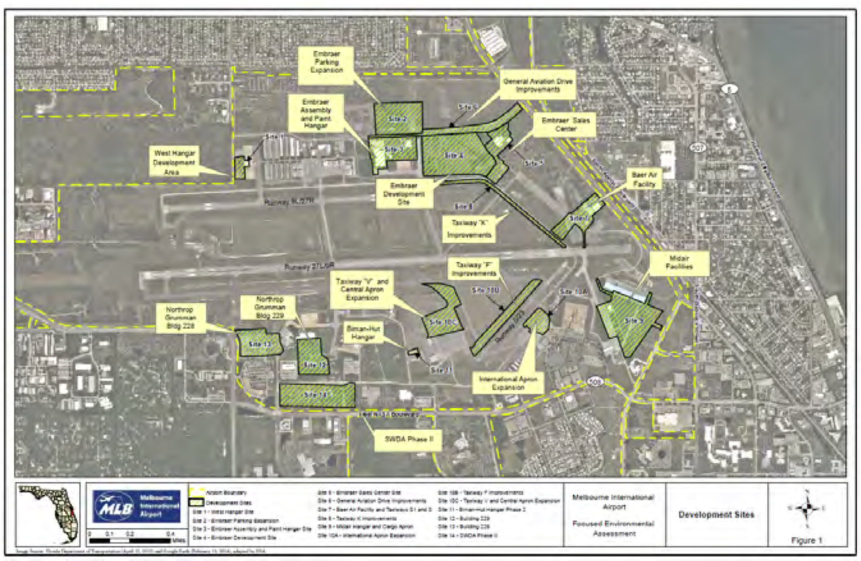
ESA Airports

Airport Changes Since 2008 Recession

- **2008** Embraer selects MLB for assembly lines and new FBO with maintenance opens (Baer Air).
- **2009** FIT Aviation relocates and expands including FBO. FIT Research Park opens.
- **2010** US Airways returns, MidAir MRO begins operations, and Kindred Hospital opens.
- **2011** Discovery Aviation begins manufacturing two different aircraft.
- **2012** Embraer begins development of Engineering and Technology Center.
- **2013** Embraer (expands assembly lines), Northrop Grumman and Harris expand facilities.
- **2014** MidAir MRO expands operations with new facilities.

ESA Airports

Recent Development Areas at MLB



ESA Airports

MLB

General Concern 1

Potential for Growth

The sponsor's recommended forecast uses a base year of 2014 with 224K passenger enplanements. Historical passenger enplanements at MLB (for the period from 2001 to 2014, as presented in Table 3-1) range from a high of 280K in 2001 to a low of 115K in 2009. Historical enplanements during this period have never risen above 280K, yet the preferred scenario suggests that this level will be reached in just a few years, and that by 2025 the airport will see nearly double the number of passengers enplanements compared to today's levels. It's not entirely clear what is driving these high growth rates. More simply, why will MLB experience this type of growth, when other airports across the U.S. and the State of Florida likely won't? And what is the reason for such an increase, when the historical data from 2001-2014 indicates periods of both growth and decline?

AEC

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ESA Airports

MLB

Historic Airport Enplanements

HISTORIC LEVELS PRIOR TO 2001

Year	Passenger Enplanements
1990	373,588
1991	339,271
1992	355,885
1993	322,012
1994	322,708
1995	301,736
1996	316,600
1997	306,163
1998	250,878
1999	278,153
2000	261,880
Average	**311,716**

HISTORIC PERIOD FOR FORECAST ANALYSES[1]

Year	Passenger Enplanements
2001	280,962
2002	201,056
2003	199,865
2004	203,386
2005	232,986
2006	167,738
2007	141,252
2008	149,012
2009	115,483
2010	183,971
2011	205,350
2012	214,371
2013	222,980
2014	224,260
2015 Estimated[2]	**241,693**

1. 2001-2014 historic period used in forecast analyses given significant changes in operating, security, and cost structures for airlines after September 11, 2001.
2. 2015 Estimate based on enplanements through September 2015 which were 7.2% over the same period in 2014.

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ESA Airports

Current Enplanements

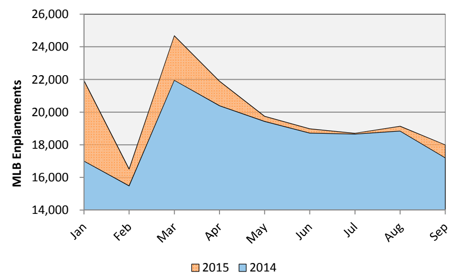
Delta and US Airways/American Airlines see Strong Growth at Melbourne International Airport

MELBOURNE, Fla. (April 22, 2015) — Commercial air travel is on the rise at Melbourne International Airport (MLB). During the first quarter of 2015, the number of passengers using MLB increased considerably over 2014, led by strong growth for Delta and US Airways/American Airlines. Both major airlines reported double-digit passenger increases during the first three months of 2015.

Delta posted a 28 percent year-over-year increase in passengers at MLB for January, with February and March enjoying single-digit increases [see attached]. The number of US Airways/American Airlines passengers jumped 25 percent in March, 2015. Overall, Delta has enjoyed a 14 percent increase during the first quarter of 2015, as the number of passengers increased from 42,671 in 2014 to 49,385 in 2015. US Airways/American Airlines experienced an 11 percent increase during the start of this year, with 10,917 passengers using MLB compared to 9,696 one year ago.

Space Coast Daily.com., April 22, 2015.

7.2% Growth over 2014!



ESA Airports

Recent Activity and Marketing Efforts

New Leadership

- Melbourne Airport Authority placed heavy emphasis on expanding passenger service.
- Greg Donovan, A.A.E. hired as new Executive Director in August 2014.

Additional Domestic Service

- Delta Airlines - new daily flight to ATL started June 2015.
- Elite Airways – new bi-weekly flight to PWM starts December 2015.

New International Service

- Porter Airlines announces scheduled international service.
- Weekly flight to YTZ starts December 2015.

New Marketing Campaign

- Marketing as Orlando Melbourne International Airport.
- MLB to show up on internet searches and online booking systems for flights into the Orlando area.

"A recent report from the FAA confirms that ticket prices from MLB rival that of MCO/Orlando. It appears that locals have gotten out of the habit to check MLB fares first. We need to change that. We're embarking on a new campaign to "Fly MLB: Where Flying is Fun." It's not fun to make the drive to Orlando, pay tolls and higher parking fees as well as to endure longer security lines, and you don't get that good feeling of helping your hometown airport to succeed."

Greg Donovan, A.A.E.
Executive Director, Melbourne International Airport
March 2015 issue of i4 Business

Recent Activity and Marketing Efforts

MLB has recently completed a plan to modernize the passenger terminal building

Florida Passenger Market Potential

Florida's Share of National Market

- 2015 TAF shows Florida generated **9.6%** of US enplanements
- Projected to reach **10.5%** by 2040 (***62 million* additional enplanements**)

Examples of Growth at Similar Airports in Florida

- **SFB** – Enplanements increased from 8,000 to 542,000 in two years after international terminal opened (1995)
- **PIE** – Enplanements increased from 194,000 to 334,000 first year after Allegiant Air started service (2006)
- **PGD** – Enplanements increased from 45,000 to 144,000 soon after Allegiant Air started service (2009)
- **DAB** – JetBlue begins service in January 2016. Enplanements will increase.

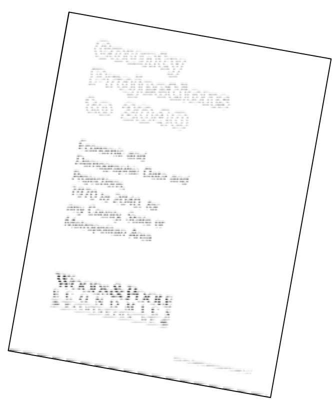
General Concern 2

Recommended Projection

In many cases, average annual growth rates for historical and forecast socioeconomic data are similar or lower for Brevard County (which is where the majority of passengers at MLB come from) compared to the State of Florida and the United States. Yet the sponsor's recommended forecast scenario for enplanements has average annual growth rates that are significantly higher than the average for Florida or the United States. It's not entirely clear from the analysis/discussion in the document how the regression analysis produced such results.

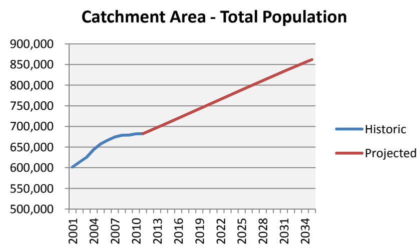
Socioeconomic Data Utilized

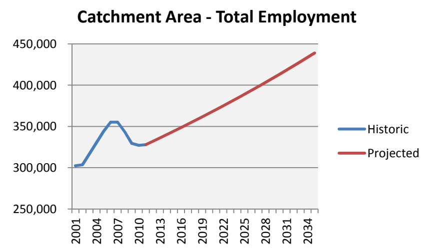
- All datasets from Woods & Poole Economics
- Datasets purchased in January 2015 included historic information through 2011
- The forecast's Regional Market / Catchment Area includes Indian River County
- In many cases, historic and projected Indian River County data is stronger when compared to other counties in Florida, the state, and the U.S.

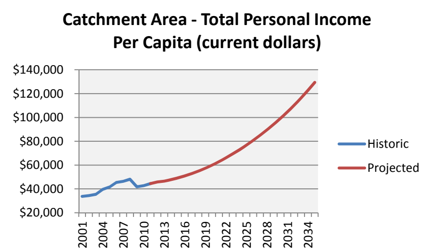


Regional Market Trends

(Woods & Poole Economics data)







Regression Analysis

Initial Model Results

- Exponential / Non-Linear Growth
- Lag in Employment and Income

Adjusted Projection

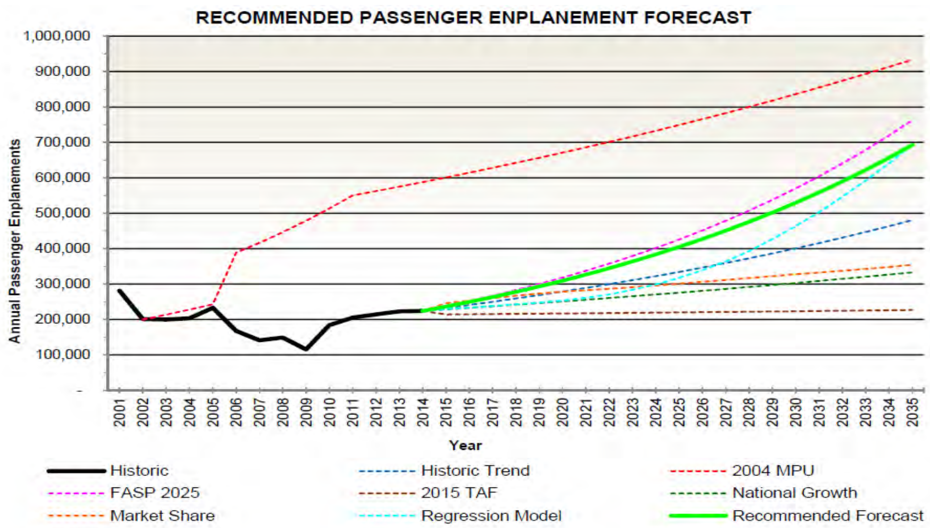
- Long Term Level Reasonable
- Projected Growth replaced with Average Annual Growth Rate

RECOMMENDED PASSENGER ENPLANEMENT FORECAST

	Selected Projection
Base Year	
2014	224,260
Forecast	
2020	309,600
2025	405,000
2035	693,100
Average Annual Change	5.5%

SOURCE: ESA Airports, 2015.

Recommended Enplanement Forecast



Source: ESA Airports, 2015.

Impact of Additional Flights

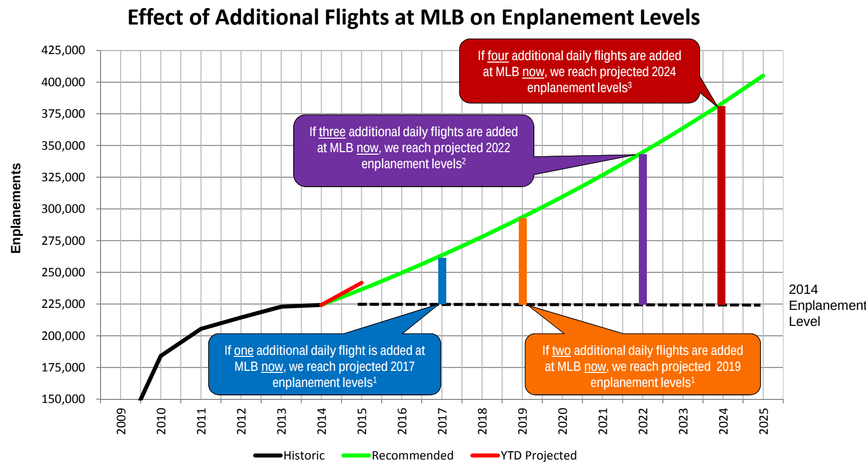
Putting the recommended forecast's 5.5% annual enplanement growth into perspective, the table below demonstrates how the addition of different flights can significantly impact current levels.

Frequency of New Service	Aircraft Size (seats)	Enplanements per Departure[3]	Additional Annual Enplanements	Percent of 2014 Enplanements
1 per Week	70	59	3,068	1.4%
1 per Week	109[1]	92	4,784	2.1%
1 per Week	150[2]	126	6,552	2.9%
3 per Week	70	59	9,204	4.1%
3 Per Week	109[1]	92	14,352	6.4%
3 Per Week	150[2]	126	19,656	8.8%
Daily	70	59	21,535	9.6%
Daily	109[1]	92	33,580	15.0%
Daily	150[2]	126	45,990	20.5%

Notes:
1. Average aircraft size (total seats) for 2014.
2. Average narrow body aircraft size (total seats) in 2014 which conducted 42% of passenger service in 2014.
3. Calculated using 2014 average boarding load factor of 84.3% for MLB.

ESA Airports

Impact of Additional Flights



Notes:
1. Aircraft with 109 seats operating at 84.3% average load factor.
2. Two aircraft with 109 seats and one aircraft with 150 seats, all operating at 84.3% average load factor.
3. Two aircraft with 109 seats and two aircraft with 150 seats, all operating at 84.3% average load factor.

ESA Airports

General Concern 3

Florida Aviation System Plan

The document references forecasts prepared annually by the Florida Department of Transportation, which appear to be a part of the Florida Aviation System Plan (FASP). There is no discussion, however, about whether the FASP forecast assumptions and results are reasonable/valid. Have previous projections for enplanements and operations in the FASP forecast been realized at Melbourne? Comparing the sponsor's preferred scenario to the FASP forecast may make the sponsor's preferred scenario seem reasonable, but that isn't necessarily the case. Further analysis and discussion would be helpful.

ESA Airports

MLB

Florida Aviation System Plan (FASP)

Florida Aviation System Plan

- The *FASP 2025* was developed by the Florida Department of Transportation in cooperation with the FAA and is maintained through the Continuing Florida Aviation System Planning Process (CFASPP).
- Provides aviation forecasts for public-use airports in Florida

Continuing Planning Process

- The CFASPP was established by the FDOT and FAA to keep the FASP up-to-date and monitor the aviation environment across Florida.
- Regular regional and state-wide meetings to gather information from airports and discuss aviation activity and trends.
- Forecast methodology incorporates information gathered by FDOT and considers local economic conditions and other factors.

For additional information, please contact:
Mr. Todd A. Cox, C.M.
FDOT Aviation Program Development Manager

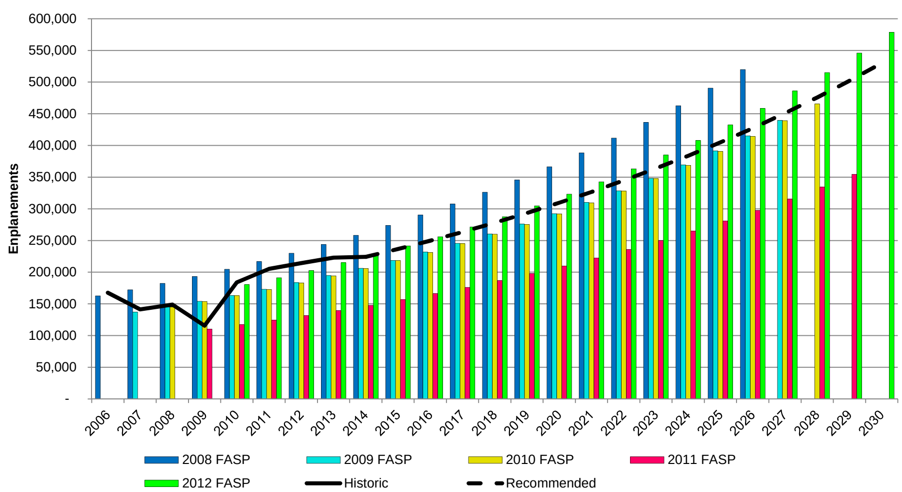
AEC

C&S COMPANIES

ESA Airports

MLB

Recent FASP Projections (MLB)



AEC

C&S COMPANIES

ESA Airports

Request to Approve Master Plan Update Forecast

- Based on historic activity and recent growth, the Master Plan needs to *identify and plan for* potential improvements.
- Forecast approval for planning purposes, MLB is not seeking to update the FAA's TAF.
- MLB's forecast would not drive development or funding decisions. Demand will dictate when improvements are needed and justified.

APPENDIX B

Terminal Transformation Conceptual Design Plan

MELBOURNE INTERNATIONAL AIRPORT

Terminal Transformation - Conceptual Design Plan

MAA WORKSHOP ISSUE - 5/27/2015

MELBOURNE AIRPORT AUTHORITY

www.brph.com

Senior Project Manager
John Genuise

BRPH Architects | Engineers | Constructors
5700 North Harbor City Boulevard
Suite 400
Melbourne
Florida 32940

T 321.7513078 F 321.259.4703 E jgenuise@brph.com

CREATIVE IDEAS. PRECISELY DELIVERED.

Table of Contents

Executive Summary

This book represents the culmination of a design process that has led to a comprehensive conceptual design for the Melbourne Airport Transformation. BRPH has worked in collaboration with Airport Leadership, staff, engineers and stakeholders to outlines the goals, needs, opportunities and challenges within the existing facility. Through BRPH design charrette process, design reviews, analysis and assessments, BRPH has developed a multiphase 20 year terminal masterplan. The designs with in the book are our recommendations for a modern, efficient, unique, Florida specific airport. Incorporated within this book are the steps we took and the outcome of our efforts.

STEP 1 – Visioning – To advance our knowledge of the airport and explore trends in terminal design the design team engaged in a visioning session that included the following:

- Benchmarking
- Theming
- Preliminary Analysis - Site, Security, Circulation, Sustainability
- Design Charrettes

STEP 2 – Program – Our first step was to understand the existing program and opportunities and challenges within. We studied programs of successful modern airports. We developed a preliminary program to create a balanced facility. This program addressed the current demand and future demand providing a path forward for a future facility. From this we developed a design for a 20 year masterplan.

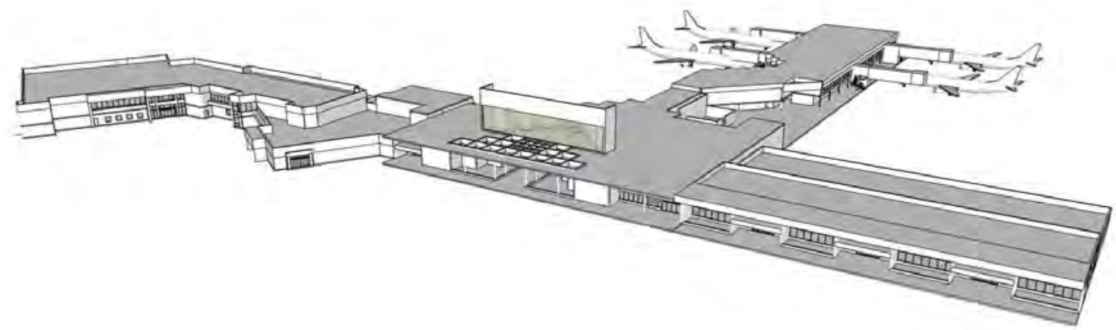
STEP 3 – Analysis – The team engaged in to wider understanding of the airport through a series of analysis. This analysis gave us a greater understanding of the potentials of the airport as a whole. From this analysis it became more evident that the airport needed more than a design update. It required site and systems updates as well. The areas explored were:

- Current Design - Limitations and Opportunities
- Design Analysis - Circulation, Security, Environments, Programing, Adjacencies, amenities
- Site Analysis - Entry, Security, Curbside, Parking, Rental Car, Out Parcels, Site Amenities
- Assessments - Roof, Curtainwall, Electrical, Mechanical, Fire Alarm, Fire Protection, Communications, Exterior Skin

STEP 4 – Terminal Masterplanning - From the analysis we began to look at design opportunities with the terminal. Through a series of design charrettes we began to incorporate the updated program into the facility. We looked at revised circulation paths, enhanced TSA, waiting area, retail, restaurants, baggage claim, and ticketing. The goals were to create a destination based design that enhanced the passenger experience and provided for future growth of the facility.

STEP 5 – Site Masterplanning – With the terminal design taking shape the design team began to look at terminal expansion concept and how that would work with the site. The team looked at arrival and departure experiences, domestic and international expansion, parking, rental car, out parcel expansion, and security.

STEP 6 - Proposed solution – Our last step to provide the airport with a proposed solution. The solution outlined within the book represents the recommended design approach for the future development of the airport. It is a comprehensive design that is scalable through multiple phases. It proposes a redesign of the current layout in the atrium and concourse and refresh in ticketing and baggage claim.

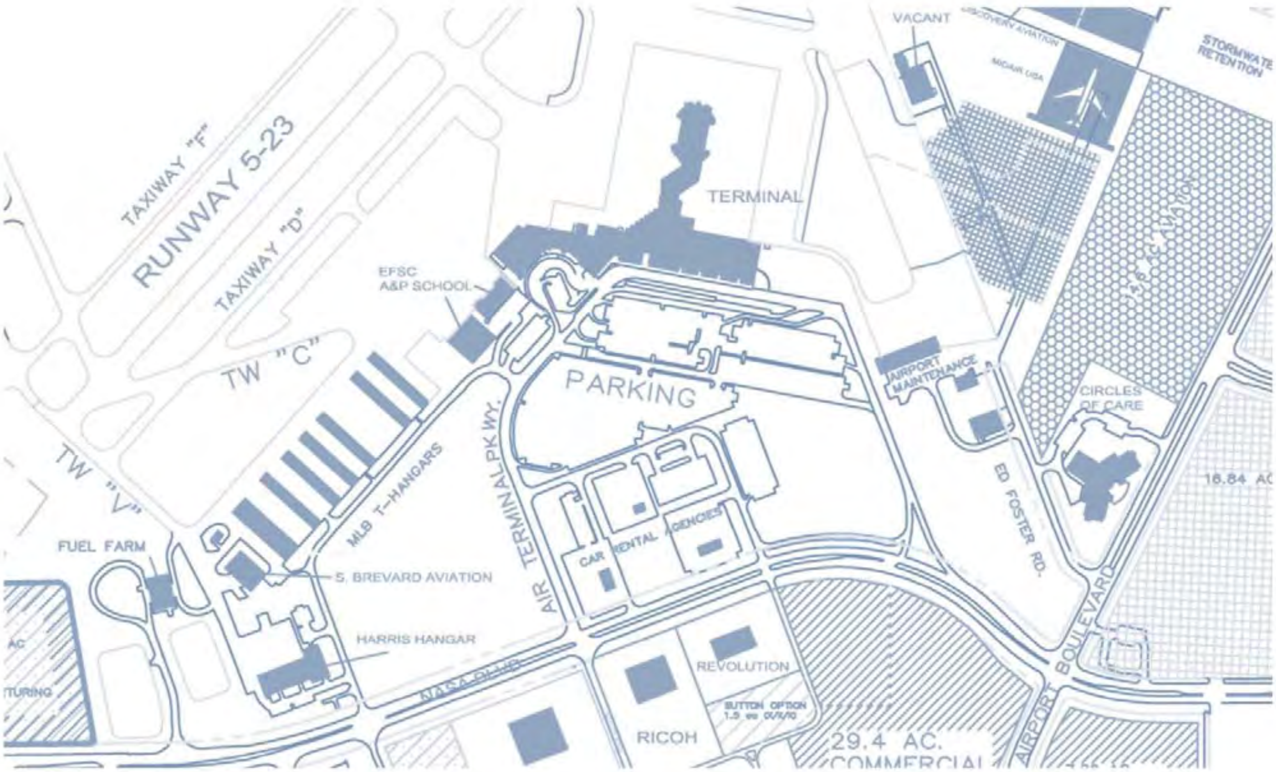


Aerial

BRPH began our design process by gaining an understanding of the facility's existing conditions. The baseline for the project was a set of existing condition documents that included:

- Aerials
- Future Land use plan
- Existing drawing – As builts
- Existing photos

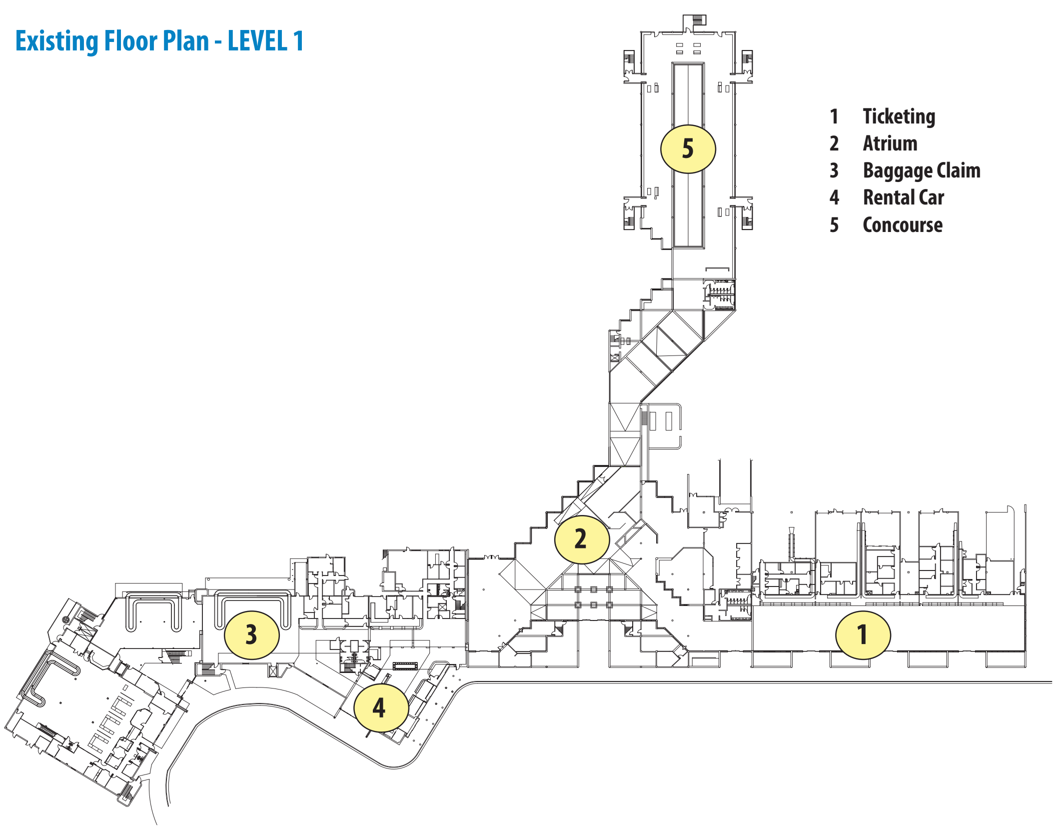
From these components BRPH developed as built CADD files and a 3d model. These documents allowed us to familiarize ourselves with the design and begin to design around and within the facility.



Floor Plans

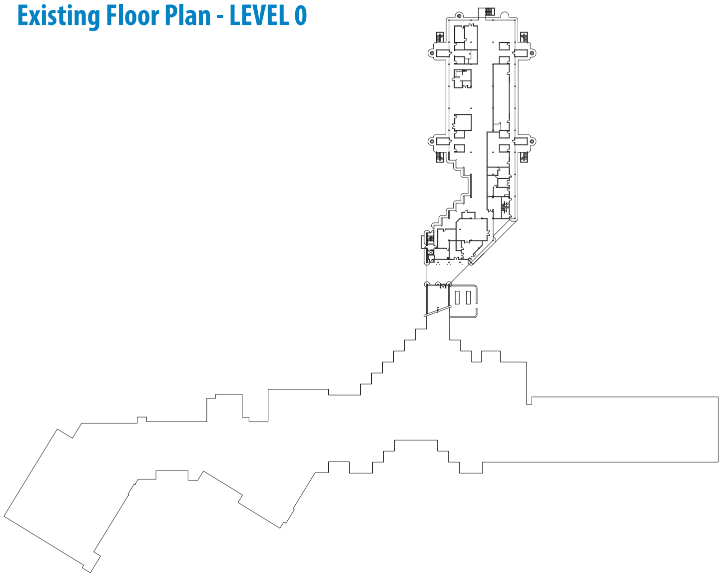
Our design team visited the site, obtained measurements, and assessed the space to develop comprehensive CADD files for the use in the concept design. These files represented here provide for the basis of the project.

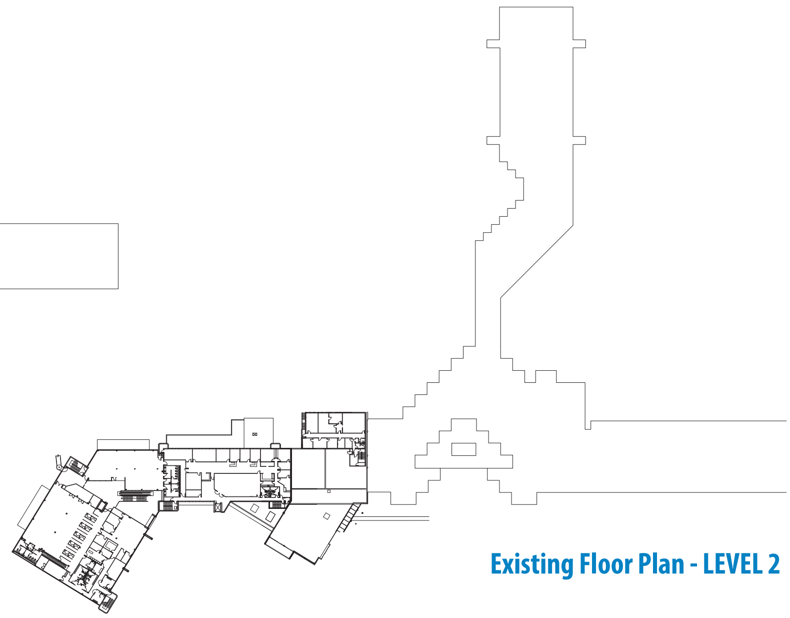
Existing Floor Plan - LEVEL 1



1 **Ticketing**
2 **Atrium**
3 **Baggage Claim**
4 **Rental Car**
5 **Concourse**

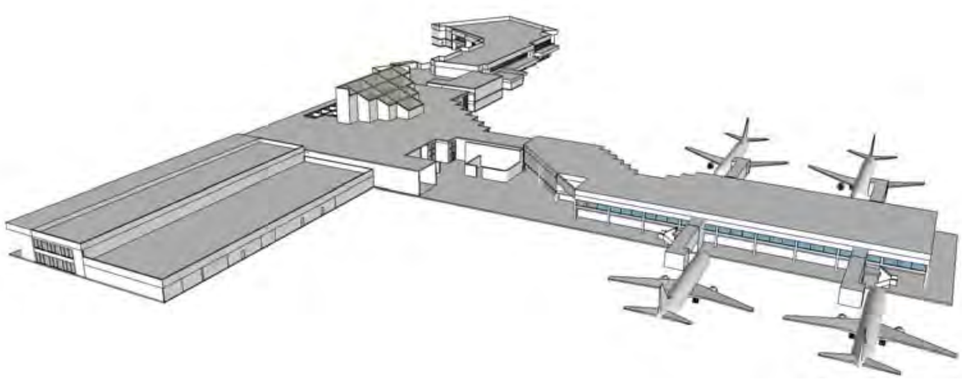
Existing Floor Plan - LEVEL 0



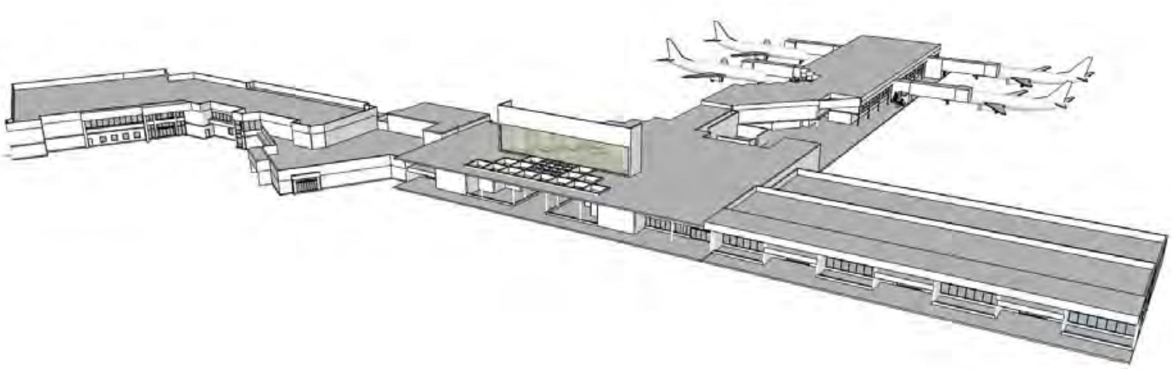


Existing Floor Plan - LEVEL 2

Existing Facility

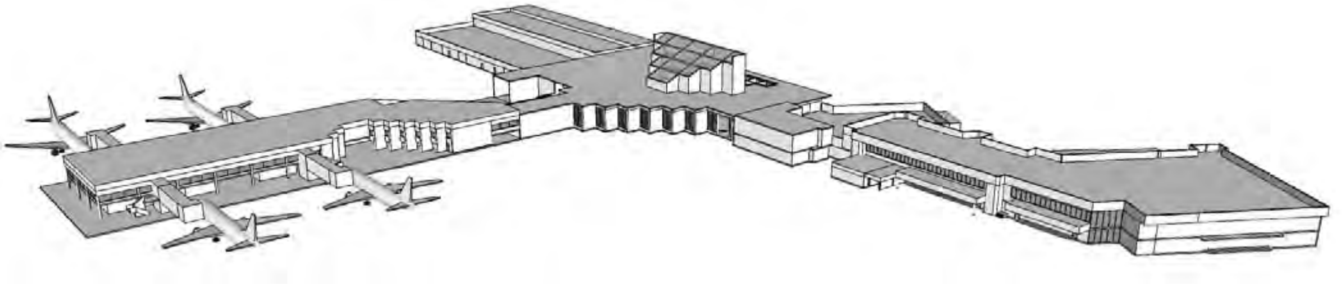


East View

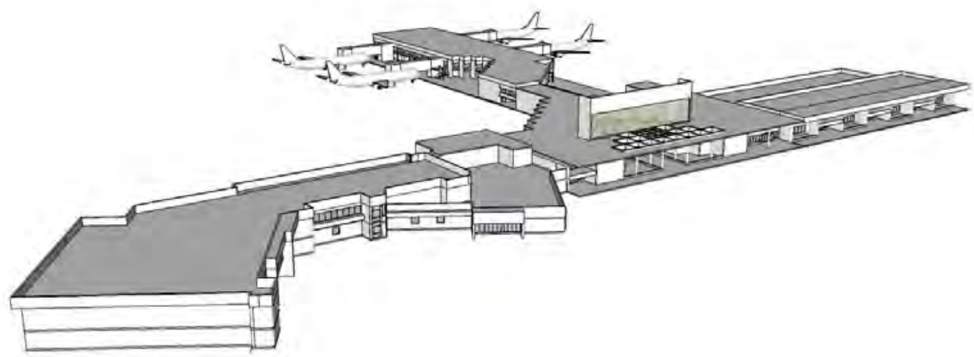


Southeast View

Existing Facility

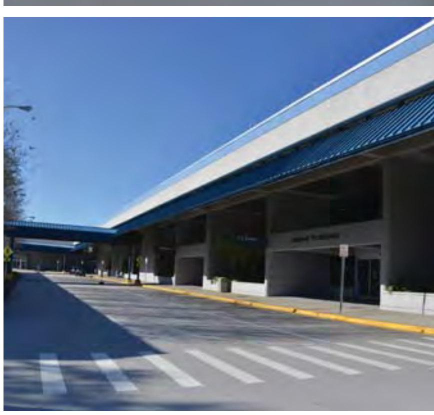


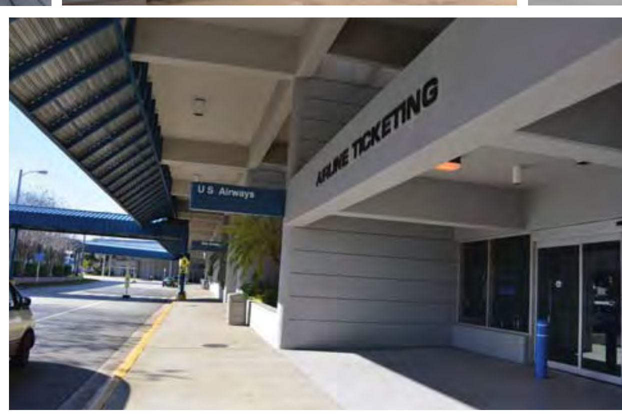
West View

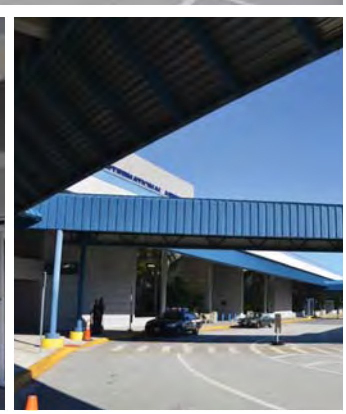


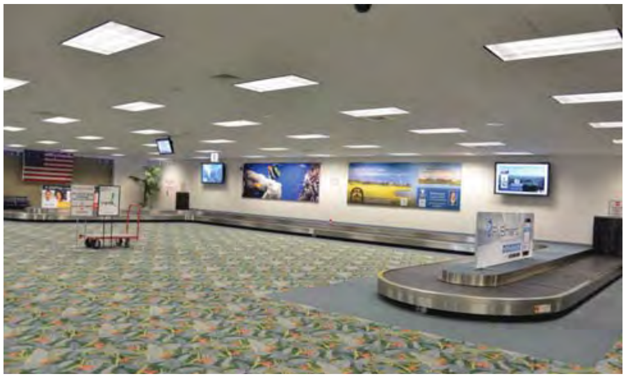
Southwest View

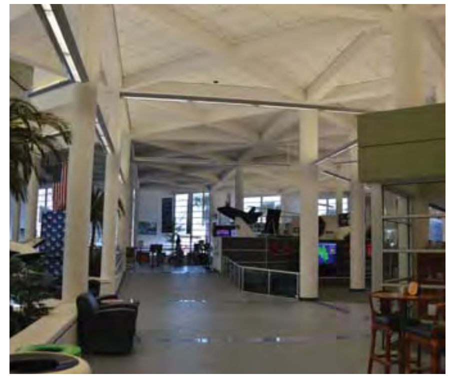
Exterior Photos

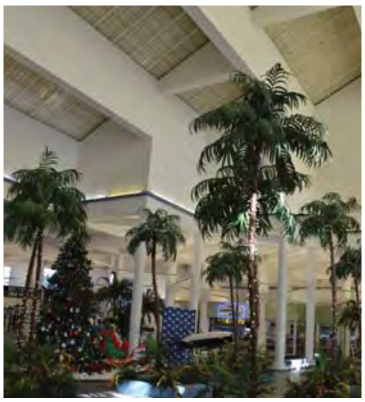










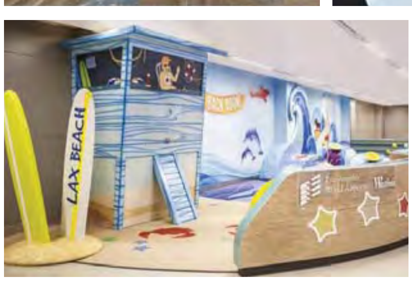


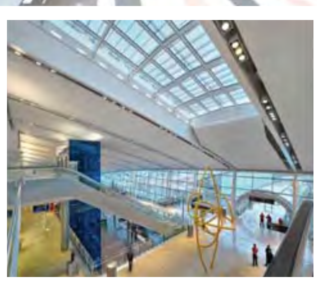
Visioning

AIRPORT GOALS

BRPH collaborated with the airport to discuss their vision for the future of the facility. They outlined the need to advance the current facility to achieve a greater catchment of passengers and showcase the airport as a destination experience. Lastly they recognized that many of the existing system components need updating. The following goals were outlined:

- Provide a more attractive environment for passengers
- Create a destination to attract passengers, local businesses and the community
- Improve security/TSA
- Enhance the passenger experience
- Improve circulation throughout the airport
- Advance the current program by adding more interactive and engaging elements – restaurants, retail, exhibit space, tourism, signature environment feature.
- Improve restaurant and retail
- Improve efficiency and longevity of the existing Mechanical, Electrical ,Life Safety
- Communications and Technology components
- Develop a plan to meet expanded domestic and international gates
- Create a balance facility












Benchmarking

Benchmarking is a way to visualize an environment before design. BRPH employs benchmarking as a tool to engage the client in dialogue on design. This process allows both the design team and the client to align in their visual aspirations. Through benchmarking, BRPH attempted to align with the Melbourne Airport's design aspirations. These images are intended to inform the potential vision of the future facility. The benchmarking for the Airport focused on the following elements:

- Atrium
- Arrival
- Restaurant / Dining
- Concourse
- Ticketing
- Water features
- Florida Feel
- Retail

These images are the foundation for the discussion of the building designs. The images are a guideline for design development. Several of these images are from other sources. Additional information on the images can be provided if necessary. The goal is these images resonate with the client's aspirations and further the discussions on design.

Airport Theme

THEME

A theme is a unifying or dominant idea or concept. It is used to provide a set of guidelines which all elements are based on. To develop a theme for the Melbourne airport transformation the design team engaged in a brainstorming session. We explore what the surrounding area had to offer and how it related to the airport. The goal was to provide a theme that resonated with the airport and connected it with the Florida environment and local community. The result of this brainstorming session led us to develop the following list:

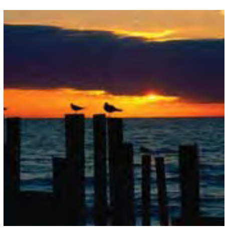
- Connection to the Environment
- On the water experience
- Connection to the community
- Corporate Mission Partners
- Local restaurants, micro brews
- Local retailers - Ron Jon, Cocoa Beach Surf Co.
- Local art exhibits
- Native Species
- Regional setting
- Natural habitats
- About this place
- Relaxed quality of life
- High tech but not high stress

From this list we developed the theme –

CASUAL FLORIDA

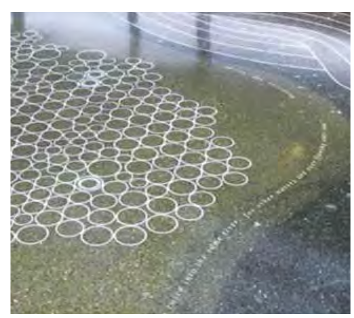
"Where it's casual Friday all the time"

It represents the business community in Melbourne that is cutting edge but not always 9-5 business. It addresses the business traveler of Melbourne that is not always in a suit and tie. It acknowledges the quality life aspect of Melbourne. It aligns with the local environment and attempts to sets itself apart from surrounding airports.



















Program Analysis

A successful airport is based on a well developed program. A well developed airport program provides for the current needs of the travels and allows for scalable growth in the future. It address future needs and associated components to meet those needs. With the goal to create a balanced facility that would meet the needs of all future visitors, the design team developed the program in the following steps:

- Step 1 - explore the existing program elements and look at ways to optimize it
- Step 2 – add new program to enhance the passenger experience
- Step 3 - aligned the program with Airports Council International standards
- Step 4 - explore national trends in airport design
- Step 5 - right size and properly locate the program components within the existing space
- Step 6- incorporate gates expansion for domestic and international
- Step 7 – program exterior space outside the terminal to optimize the passenger experience and meet their future needs
- Step 8 – develop a 20 year masterplan program that meets the needs of todays passenger and tomorrows

The program was developed the following phases and relate to the Phase Plans shown in Section - Site Analysis/Phasing:

- 2015 Domestic Program – what is needed to provide for the current population of the airport (5gates)
- 2016 International Program – what is needed to provide for Domestic and the addition of an international carrier (7 gates)
- 2028 Domestic/International Program - what is needed for both Domestic and International (10 gates)
- 2035 Full Expansion Program – what will the airport look like in 20 years (12 gates)
- 2035 Full Expansion Program - Option (13 gates)

For phase 1, it was determined that the existing airport areas would be sufficient to provide the current demands.

PHASE 1 Program

Melbourne International Airport	Terminal Transformation Master Plan					YR: 2015 (Demand)	Draft	5/15/2015	Class 1	Class 2
Program of Areas (BFR)	NB		Domestic	WB		International				
Number of Gates			5			0				
LANDSIDE:										
	Units	**Total/Gate**			**Total/Gate**					
AIRLINE										
Ticket Counter	10x25	250 sf	1250 sf		450 sf	0 sf	**1,250**	**sf**	1,250	
Agent Positions	4		20	6		0	**20**	**Agents**		
Airline ticket offices (ATO)	18 x 20	360 sf	1800 sf		648 sf	0 sf	**1,800**	**sf**	1,800	
Curbside check-in	4x 20	80 sf	400 sf		120 sf	0 sf	**400**	**sf**		400
Baggage Claim	4 Gates	1240 sf	6200 sf		2480 sf	0 sf	**6,200**	**sf**	6,200	
Baggage Claim Devices	1		1	0		0	**1**	**Belts**		
Bag Service Office		375 sf	1875 sf		375 sf	0 sf	**1,875**	**sf**	1,875	
Bag Drop Off - Baggage Claim	1	370 sf	1850 sf	0	650 sf	0 sf	**1,850**	**sf**		1,850
Baggage Make-up		650 sf	3250 sf		1150 sf	0 sf	**3,250**	**sf**		3,250
TSA Bag Screening		350 sf	1750 sf		650 sf	0 sf	**1,750**	**sf**		1,750
L/S AIRLINE LEASE SPACE-SUBTOTAL:		**3675 sf**	**18375 sf**		**6523 sf**	**0 sf**	**18,375**	**sf**	**11,125**	**7,250**
NON-AIRLINE										
Tug circulation		475 sf	2375 sf		855 sf	0 sf	**2,375**	**sf**		2,375
Ticket Queue, Curb & Gen Public Circ.		2000 sf	10000 sf		3600 sf	0 sf	**10,000**	**sf**	10,000	
Bag Claim, Grnd.Trans. & RAC Public Circulation		2000 sf	10000 sf		3600 sf	0 sf	**10,000**	**sf**	10,000	
Security Lobby		400 sf	2000 sf		720 sf	0 sf	**2,000**	**sf**	2,000	
Office Support--MAA and Other		1400 sf	7000 sf		2520 sf	0 sf	**7,000**	**sf**	7,000	
Rent-a-car , Grnd Trans.& Tour Group		375 sf	1875 sf		675 sf	0 sf	**1,875**	**sf**	1,875	
RAC, Grnd Trans.& Tour Gr.Counters		15 sf	75 sf		27 sf	0 sf	**75**	**sf**	75	
Concessions (F & B, Retail, Ent.)		1800 sf	9000 sf		3240 sf	0 sf	**9,000**	**sf**	9,000	
Vertical circulation		800 sf	4000 sf		1440 sf	0 sf	**4,000**	**sf**	4,000	
Delivery Docks & Fac., Dumpsters		475 sf	2375 sf		855 sf	0 sf	**2,375**	**sf**		2,375
Toilets, support space, Janitorial		600 sf	3000 sf		1080 sf	0 sf	**3,000**	**sf**	3,000	
Mech, Elect., Communications		1000 sf	5000 sf		1800 sf	0 sf	**5,000**	**sf**	5,000	
L/S NON-AIRLINE-SUBTOTAL:		**11340 sf**	**56700 sf**		**20412 sf**	**0 sf**	**56,700**	**sf**	**51,950**	**4,750**
TOTAL-LANDSIDE		**15015 sf**	**75075 sf**		**26935 sf**	**0 sf**	**75,075**	**sf**	**63,075**	**12,000**
AIRSIDE:										
AIRLINE										
Passenger holdroom	150/15P	2300 sf	11500 sf	300/15 P	4500 sf	0 sf	**11,500**	**sf**	11,500	
ATO/Ticketing		410 sf	2050 sf		750 sf	0 sf	**2,050**	**sf**	2,050	
Holdroom Circulation		1150 sf	5750 sf		2250 sf	0 sf	**5,750**	**sf**	5,750	
Ramp operations space		1000 sf	5000 sf		2300 sf	0 sf	**5,000**	**sf**		5,000
Undercover storage area		1850 sf	9250 sf		3350 sf	0 sf	**9,250**	**sf**		9,250
VIP club room facilities		400 sf	2000 sf		720 sf	0 sf	**2,000**	**sf**	2,000	
Airline Jet Gate Subtotal:		**7110 sf**	**35550 sf**		**13870 sf**	**0 sf**	**35,550**	**sf**	**21,300**	**14,250**
NON AIRLINE										
Concessions (F & B, Retail, Guest Serv.Ent.)		2300 sf	11500 sf		4200 sf	0 sf	**11,500**	**sf**	11,500	
Office Support--MAA and Other		350 sf	1750 sf		630 sf	0 sf	**1,750**	**sf**	1,750	
Public circulation space		2500 sf	12500 sf		4500 sf	0 sf	**12,500**	**sf**	12,500	
Vertical circulation		250 sf	1250 sf		450 sf	0 sf	**1,250**	**sf**	1,250	
Toilets, support space, Janitorial		700 sf	3500 sf		1260 sf	0 sf	**3,500**	**sf**	3,500	
Mech, Elect., Communications		1350 sf	6750 sf		2430 sf	0 sf	**6,750**	**sf**	6,750	
AIRSIDE NON-AIRLINE-SUBTOTAL:		**7450 sf**	**37250 sf**		**13470 sf**	**0 sf**	**37,250**	**sf**	**37,250**	**0**
AIRSIDE-DOMESTIC-SUBTOTAL:		**14560 sf**	**72800 sf**		**27340 sf**	**0 sf**	**72,800**	**sf**	**58,550**	**14,250**
INTERNATIONAL										
Sterile Circulation		0 sf	0 sf		1500 sf	0 sf	**0**	**sf**	0	
Federal Inspections Station Not In Program										
INTERNATIONAL LEASE SPACE-SUBTOTAL:		**0 sf**	**0 sf**		**1500 sf**	**0 sf**	**0**	**sf**	**0**	0
AIRSIDE-AIRLINE-SUBTOTAL:		**0 sf**	**72,800 sf**		**1500 sf**	**0 sf**	**72,800**	**sf**	**58,550**	
TOTAL AIRSIDE AND LANDSIDE:		**0 sf**	**72,800 sf**		**1500 sf**	**0 sf**	**147,875**	**sf**	**121,625**	**26,250**

2015 Program

2016 Phase 1.5 - International Program

Phase 1.5 proposes a scenario and a program of areas for the airport that accommodates the introduction of an international carrier to the airport. International traffic is generally based on a larger fleet mix of aircraft. Terminal facilities that accommodate the increased passenger load are proportionately larger. The 2016 program increases facilities for Holdroom Areas, Baggage Claim, Ticketing, Security Checkpoint, Rental Car, Ground Transportation and Curbside. It is anticipated that the terminal will increase beyond the current capacity if an international carrier is introduced. The program and conceptual plan will necessarily occupy level two areas of the terminal that are currently being used for support and administrative functions. Layouts proposing these additions are depicted in the phase 1.5 options plans.

Phase 1.5 Program

Melbourne International Airport			Terminal Transformation Master Plan			YR: 2016 (International)	Draft	5/15/2015	Class 1	Class 2
Program of Areas (BFR)		NB	Domestic	WB		International				
Number of Gates			5			2				
LANDSIDE:										
	Units	**Total/Gate**			**Total/Gate**					
AIRLINE										
Ticket Counter	10x25	250 sf	1250 sf		450 sf	900 sf	**2,150**	**sf**	2,150	
Agent Positions	4		20	6		12	**32**	**Agents**		
Airline ticket offices (ATO)	18 x 20	360 sf	1800 sf		648 sf	1296 sf	**3,096**	**sf**	3,096	
Curbside check-in	4x 20	80 sf	400 sf		120 sf	240 sf	**640**	**sf**		640
Baggage Claim	4 Gates	1240 sf	6200 sf		2480 sf	4960 sf	**11,160**	**sf**	11,160	
Baggage Claim Devices	1		1	1		1	**2**	**Belts**		
Bag Service Office		375 sf	1875 sf		375 sf	750 sf	**2,625**	**sf**	2,625	
Bag Drop Off - Baggage Claim	1	370 sf	1850 sf	1	650 sf	1300 sf	**3,150**	**sf**		3,150
Baggage Make-up		650 sf	3250 sf		1150 sf	2300 sf	**5,550**	**sf**		5,550
TSA Bag Screening		350 sf	1750 sf		650 sf	1300 sf	**3,050**	**sf**		3,050
L/S AIRLINE LEASE SPACE-SUBTOTAL:		**3675 sf**	**18375 sf**		**6523 sf**	**13046 sf**	**31,421**	**sf**	**19,031**	**12,390**
NON-AIRLINE										
Tug circulation		475 sf	2375 sf		855 sf	1710 sf	**4,085**	**sf**		4,085
Ticket Queue, Curb & Gen Public Circ.		2000 sf	10000 sf		3600 sf	7200 sf	**17,200**	**sf**	17,200	
Bag Claim, Grnd.Trans. & RAC Public Circulation		2000 sf	10000 sf		3600 sf	7200 sf	**17,200**	**sf**	17,200	
Security Lobby		400 sf	2000 sf		720 sf	1440 sf	**3,440**	**sf**	3,440	
Office Support--MAA and Other		1400 sf	7000 sf		2520 sf	5040 sf	**12,040**	**sf**	12,040	
Rent-a-car , Grnd Trans.& Tour Group		375 sf	1875 sf		675 sf	1350 sf	**3,225**	**sf**	3,225	
RAC, Grnd Trans.& Tour Gr.Counters		15 sf	75 sf		27 sf	54 sf	**129**	**sf**	129	
Concessions (F & B, Retail, Ent.)		1800 sf	9000 sf		3240 sf	6480 sf	**15,480**	**sf**	15,480	
Vertical circulation		800 sf	4000 sf		1440 sf	2880 sf	**6,880**	**sf**	6,880	
Delivery Docks & Fac., Dumpsters		475 sf	2375 sf		855 sf	1710 sf	**4,085**	**sf**		4,085
Toilets, support space, Janitorial		600 sf	3000 sf		1080 sf	2160 sf	**5,160**	**sf**	5,160	
Mech, Elect., Communications		1000 sf	5000 sf		1800 sf	3600 sf	**8,600**	**sf**	8,600	
L/S NON-AIRLINE-SUBTOTAL:		**11340 sf**	**56700 sf**		**20412 sf**	**40824 sf**	**97,524**	**sf**	**89,354**	**8,170**
TOTAL-LANDSIDE		**15015 sf**	**75075 sf**		**26935 sf**	**53870 sf**	**128,945**	**sf**	**108,385**	**20,560**
AIRSIDE:										
AIRLINE										
Passenger holdroom	150/15P	2300 sf	11500 sf	300/15 P	4500 sf	9000 sf	**20,500**	**sf**	20,500	
ATO/Ticketing		410 sf	2050 sf		750 sf	1500 sf	**3,550**	**sf**	3,550	
Holdroom Circulation		1150 sf	5750 sf		2250 sf	4500 sf	**10,250**	**sf**	10,250	
Ramp operations space		1000 sf	5000 sf		2300 sf	4600 sf	**9,600**	**sf**		9,600
Undercover storage area		1850 sf	9250 sf		3350 sf	6700 sf	**15,950**	**sf**		15,950
VIP club room facilities		400 sf	2000 sf		720 sf	1440 sf	**3,440**	**sf**	3,440	
Airline Jet Gate Subtotal:		**7110 sf**	**35550 sf**		**13870 sf**	**27740 sf**	**63,290**	**sf**	**37,740**	**25,550**
NON AIRLINE										
Concessions (F & B, Retail, Guest Serv.Ent.)		2300 sf	11500 sf		4200 sf	8400 sf	**19,900**	**sf**	19,900	
Office Support--MAA and Other		350 sf	1750 sf		630 sf	1260 sf	**3,010**	**sf**	3,010	
Public circulation space		2500 sf	12500 sf		4500 sf	9000 sf	**21,500**	**sf**	21,500	
Vertical circulation		250 sf	1250 sf		450 sf	900 sf	**2,150**	**sf**	2,150	
Toilets, support space, Janitorial		700 sf	3500 sf		1260 sf	2520 sf	**6,020**	**sf**	6,020	
Mech, Elect., Communications		1350 sf	6750 sf		2430 sf	4860 sf	**11,610**	**sf**	11,610	
AIRSIDE NON-AIRLINE-SUBTOTAL:		**7450 sf**	**37250 sf**		**13470 sf**	**26940 sf**	**64,190**	**sf**	**64,190**	**0**
AIRSIDE-DOMESTIC-SUBTOTAL:		**14560 sf**	**72800 sf**		**27340 sf**	**54680 sf**	**127,480**	**sf**	**101,930**	**25,550**
INTERNATIONAL										
Sterile Circulation		0 sf	0 sf		1500 sf	3000 sf	**3,000**	**sf**	3,000	
Federal Inspections Station Not In Program										
INTERNATIONAL LEASE SPACE-SUBTOTAL:		**0 sf**	**0 sf**		**1500 sf**	**3000 sf**	**3,000**	**sf**	**3,000**	0
AIRSIDE-AIRLINE-SUBTOTAL:		**0 sf**	**72,800 sf**		**1500 sf**	**57,680 sf**	**130,480**	**sf**	**104,930**	
TOTAL AIRSIDE AND LANDSIDE:		**0 sf**	**72,800 sf**		**1500 sf**	**57,680 sf**	**259,425**	**sf**	**213,315**	**46,110**

2016 Program

2028 Phase 2 - Domestic/International Program

Phase 2 proposes a mid-term development that accommodates ten gates. This increases the number of gates by one hundred percent. The phase two program anticipates 2 international gates and 8 domestic gates. It is essentially the continuation of the phase 1 program with additional air service that is anticipated from the return and augmentation of aircraft catchment to Melbourne International Airport from neighboring airports over the next fifteen years. An airside hub accommodating additional food and beverage and retail venues is part of this program. The program will require one additional baggage claim unit to be in operation as well as additional ticketing, security checkpoint stations and curbside area.

Phase 2 Program

Melbourne International Airport			Terminal Transformation Master Plan			YR: 2028 (International)	Draft	5/15/2015	Class 1	Class 2
Program of Areas (BFR)		NB	Domestic	WB		International				
Number of Gates			8			2				
LANDSIDE:										
	Units	**Total/Gate**			**Total/Gate**					
AIRLINE										
Ticket Counter	10x25	250 sf	2000 sf		450 sf	900 sf	**2,900**	**sf**	2,900	
Agent Positions	4		32	6		12	**44**	**Agents**		
Airline ticket offices (ATO)	18 x 20	360 sf	2880 sf		648 sf	1296 sf	**4,176**	**sf**	4,176	
Curbside check-in	4x 20	80 sf	640 sf		120 sf	240 sf	**880**	**sf**		880
Baggage Claim	4 Gates	1240 sf	9920 sf		2480 sf	4960 sf	**14,880**	**sf**	14,880	
Baggage Claim Devices	2		2	1		1	**3**	**Belts**		
Bag Service Office		375 sf	3000 sf		375 sf	750 sf	**3,750**	**sf**	3,750	
Bag Drop Off - Baggage Claim	2	370 sf	2960 sf	1	650 sf	1300 sf	**4,260**	**sf**		4,260
Baggage Make-up		650 sf	5200 sf		1150 sf	2300 sf	**7,500**	**sf**		7,500
TSA Bag Screening		350 sf	2800 sf		650 sf	1300 sf	**4,100**	**sf**		4,100
L/S AIRLINE LEASE SPACE-SUBTOTAL:		**3675 sf**	**29400 sf**		**6523 sf**	**13046 sf**	**42,446**	**sf**	**25,706**	**16,740**
NON-AIRLINE										
Tug circulation		475 sf	3800 sf		855 sf	1710 sf	**5,510**	**sf**		5,510
Ticket Queue, Curb & Gen Public Circ.		2000 sf	16000 sf		3600 sf	7200 sf	**23,200**	**sf**	23,200	
Bag Claim, Grnd.Trans. & RAC Public Circulation		2000 sf	16000 sf		3600 sf	7200 sf	**23,200**	**sf**	23,200	
Security Lobby		400 sf	3200 sf		720 sf	1440 sf	**4,640**	**sf**	4,640	
Office Support--MAA and Other		1400 sf	11200 sf		2520 sf	5040 sf	**16,240**	**sf**	16,240	
Rent-a-car , Grnd Trans.& Tour Group		375 sf	3000 sf		675 sf	1350 sf	**4,350**	**sf**	4,350	
RAC, Grnd Trans.& Tour Gr.Counters		15 sf	120 sf		27 sf	54 sf	**174**	**sf**	174	
Concessions (F & B, Retail, Ent.)		1800 sf	14400 sf		3240 sf	6480 sf	**20,880**	**sf**	20,880	
Vertical circulation		800 sf	6400 sf		1440 sf	2880 sf	**9,280**	**sf**	9,280	
Delivery Docks & Fac., Dumpsters		475 sf	3800 sf		855 sf	1710 sf	**5,510**	**sf**		5,510
Toilets, support space, Janitorial		600 sf	4800 sf		1080 sf	2160 sf	**6,960**	**sf**	6,960	
Mech, Elect., Communications		1000 sf	8000 sf		1800 sf	3600 sf	**11,600**	**sf**	11,600	
L/S NON-AIRLINE-SUBTOTAL:		**11340 sf**	**90720 sf**		**20412 sf**	**40824 sf**	**131,544**	**sf**	**120,524**	**11,020**
TOTAL-LANDSIDE		**15015 sf**	**120120 sf**		**26935 sf**	**53870 sf**	**173,990**	**sf**	**146,230**	**27,760**
AIRSIDE:										
AIRLINE										
Passenger holdroom	150/15P	2300 sf	18400 sf	300/15 P	4500 sf	9000 sf	**27,400**	**sf**	27,400	
ATO/Ticketing		410 sf	3280 sf		750 sf	1500 sf	**4,780**	**sf**	4,780	
Holdroom Circulation		1150 sf	9200 sf		2250 sf	4500 sf	**13,700**	**sf**	13,700	
Ramp operations space		1000 sf	8000 sf		2300 sf	4600 sf	**12,600**	**sf**		12,600
Undercover storage area		1850 sf	14800 sf		3350 sf	6700 sf	**21,500**	**sf**		21,500
VIP club room facilities		400 sf	3200 sf		720 sf	1440 sf	**4,640**	**sf**	4,640	
Airline Jet Gate Subtotal:		**7110 sf**	**56880 sf**		**13870 sf**	**27740 sf**	**84,620**	**sf**	**50,520**	**34,100**
NON AIRLINE										
Concessions (F & B, Retail, Guest Serv.Ent.)		2300 sf	18400 sf		4200 sf	8400 sf	**26,800**	**sf**	26,800	
Office Support--MAA and Other		350 sf	2800 sf		630 sf	1260 sf	**4,060**	**sf**	4,060	
Public circulation space		2500 sf	20000 sf		4500 sf	9000 sf	**29,000**	**sf**	29,000	
Vertical circulation		250 sf	2000 sf		450 sf	900 sf	**2,900**	**sf**	2,900	
Toilets, support space, Janitorial		700 sf	5600 sf		1260 sf	2520 sf	**8,120**	**sf**	8,120	
Mech, Elect., Communications		1350 sf	10800 sf		2430 sf	4860 sf	**15,660**	**sf**	15,660	
AIRSIDE NON-AIRLINE-SUBTOTAL:		**7450 sf**	**59600 sf**		**13470 sf**	**26940 sf**	**86,540**	**sf**	**86,540**	**0**
AIRSIDE-DOMESTIC-SUBTOTAL:		**14560 sf**	**116480 sf**		**27340 sf**	**54680 sf**	**171,160**	**sf**	**137,060**	**34,100**
INTERNATIONAL										
Sterile Circulation		0 sf	0 sf		1500 sf	3000 sf	**3,000**	**sf**	3,000	
Federal Inspections Station Not In Program										
INTERNATIONAL LEASE SPACE-SUBTOTAL:		**0 sf**	**0 sf**		**1500 sf**	**3000 sf**	**3,000**	**sf**	**3,000**	0
AIRSIDE-AIRLINE-SUBTOTAL:		**0 sf**	**116,480 sf**		**1500 sf**	**57,680 sf**	**174,160**	**sf**	**140,060**	
TOTAL AIRSIDE AND LANDSIDE:		**0 sf**	**116,480 sf**		**1500 sf**	**57,680 sf**	**348,150**	**sf**	**286,290**	**61,860**

2028 Program

Phase 3 Program										
Melbourne International Airport	Terminal Transformation Master Plan					YR: 2035 (International)	Draft	5/15/2015	Class 1	Class 2
Program of Areas (BFR)	NB		Domestic	WB		International				
Number of Gates			12			2				
LANDSIDE:										
	Units	**Total/Gate**			**Total/Gate**					
AIRLINE										
Ticket Counter	10x25	250 sf	3000 sf		450 sf	900 sf	**3,900**	**sf**	3,900	
Agent Positions	4		48	6		12	**60**	**Agents**		
Airline ticket offices (ATO)	18 x 20	360 sf	4320 sf		648 sf	1296 sf	**5,616**	**sf**	5,616	
Curbside check-in	4x 20	80 sf	960 sf		120 sf	240 sf	**1,200**	**sf**		1,200
Baggage Claim	4 Gates	1240 sf	14880 sf		2480 sf	4960 sf	**19,840**	**sf**	19,840	
Baggage Claim Devices	3		3	1		1	**4**	**Belts**		
Bag Service Office		375 sf	4500 sf		375 sf	750 sf	**5,250**	**sf**	5,250	
Bag Drop Off - Baggage Claim	3	370 sf	4440 sf	1	650 sf	1300 sf	**5,740**	**sf**		5,740
Baggage Make-up		650 sf	7800 sf		1150 sf	2300 sf	**10,100**	**sf**		10,100
TSA Bag Screening		350 sf	4200 sf		650 sf	1300 sf	**5,500**	**sf**		5,500
L/S AIRLINE LEASE SPACE-SUBTOTAL:		**3675 sf**	**44100 sf**		**6523 sf**	**13046 sf**	**57,146**	**sf**	**34,606**	**22,540**
NON-AIRLINE										
Tug circulation		475 sf	5700 sf		855 sf	1710 sf	**7,410**	**sf**		7,410
Ticket Queue, Curb & Gen Public Circ.		2000 sf	24000 sf		3600 sf	7200 sf	**31,200**	**sf**	31,200	
Bag Claim, Grnd.Trans. & RAC Public Circulation		2000 sf	24000 sf		3600 sf	7200 sf	**31,200**	**sf**	31,200	
Security Lobby		400 sf	4800 sf		720 sf	1440 sf	**6,240**	**sf**	6,240	
Office Support--MAA and Other		1400 sf	16800 sf		2520 sf	5040 sf	**21,840**	**sf**	21,840	
Rent-a-car , Grnd Trans.& Tour Group		375 sf	4500 sf		675 sf	1350 sf	**5,850**	**sf**	5,850	
RAC, Grnd Trans.& Tour Gr.Counters		15 sf	180 sf		27 sf	54 sf	**234**	**sf**	234	
Concessions (F & B, Retail, Ent.)		1800 sf	21600 sf		3240 sf	6480 sf	**28,080**	**sf**	28,080	
Vertical circulation		800 sf	9600 sf		1440 sf	2880 sf	**12,480**	**sf**	12,480	
Delivery Docks & Fac., Dumpsters		475 sf	5700 sf		855 sf	1710 sf	**7,410**	**sf**		7,410
Toilets, support space, Janitorial		600 sf	7200 sf		1080 sf	2160 sf	**9,360**	**sf**	9,360	
Mech, Elect., Communications		1000 sf	12000 sf		1800 sf	3600 sf	**15,600**	**sf**	15,600	
L/S NON-AIRLINE-SUBTOTAL:		**11340 sf**	**136080 sf**		**20412 sf**	**40824 sf**	**176,904**	**sf**	**162,084**	**14,820**
TOTAL-LANDSIDE		**15015 sf**	**180180 sf**		**26935 sf**	**53870 sf**	**234,050**	**sf**	**196,690**	**37,360**
AIRSIDE:										
AIRLINE										
Passenger holdroom	150/15P	2300 sf	27600 sf	300/15 P	4500 sf	9000 sf	**36,600**	**sf**	36,600	
ATO/Ticketing		410 sf	4920 sf		750 sf	1500 sf	**6,420**	**sf**	6,420	
Holdroom Circulation		1150 sf	13800 sf		2250 sf	4500 sf	**18,300**	**sf**	18,300	
Ramp operations space		1000 sf	12000 sf		2300 sf	4600 sf	**16,600**	**sf**		16,600
Undercover storage area		1850 sf	22200 sf		3350 sf	6700 sf	**28,900**	**sf**		28,900
VIP club room facilities		400 sf	4800 sf		720 sf	1440 sf	**6,240**	**sf**	6,240	
Airline Jet Gate Subtotal:		**7110 sf**	**85320 sf**		**13870 sf**	**27740 sf**	**113,060**	**sf**	**67,560**	**45,500**
NON AIRLINE										
Concessions (F & B, Retail, Guest Serv.Ent.)		2300 sf	27600 sf		4200 sf	8400 sf	**36,000**	**sf**	36,000	
Office Support--MAA and Other		350 sf	4200 sf		630 sf	1260 sf	**5,460**	**sf**	5,460	
Public circulation space		2500 sf	30000 sf		4500 sf	9000 sf	**39,000**	**sf**	39,000	
Vertical circulation		250 sf	3000 sf		450 sf	900 sf	**3,900**	**sf**	3,900	
Toilets, support space, Janitorial		700 sf	8400 sf		1260 sf	2520 sf	**10,920**	**sf**	10,920	
Mech, Elect., Communications		1350 sf	16200 sf		2430 sf	4860 sf	**21,060**	**sf**	21,060	
AIRSIDE NON-AIRLINE-SUBTOTAL:		**7450 sf**	**89400 sf**		**13470 sf**	**26940 sf**	**116,340**	**sf**	**116,340**	**0**
AIRSIDE-DOMESTIC-SUBTOTAL:		**14560 sf**	**174720 sf**		**27340 sf**	**54680 sf**	**229,400**	**sf**	**183,900**	**45,500**
INTERNATIONAL										
Sterile Circulation		0 sf	0 sf		1500 sf	3000 sf	**3,000**	**sf**	3,000	
Federal Inspections Station Not In Program										
INTERNATIONAL LEASE SPACE-SUBTOTAL:		**0 sf**	**0 sf**		**1500 sf**	**3000 sf**	**3,000**	**sf**	**3,000**	0
AIRSIDE-AIRLINE-SUBTOTAL:		**0 sf**	**174,720 sf**		**1500 sf**	**57,680 sf**	**232,400**	**sf**	**186,900**	
TOTAL AIRSIDE AND LANDSIDE:		**0 sf**	**174,720 sf**		**1500 sf**	**57,680 sf**	**466,450**	**sf**	**383,590**	**82,860**

2035 Program

2035 Phase 3 Program

The Phase 3 (2035) program looks 20 years into the future and how the airport will need to respond to the demands of additional travelers. The airport expands to 14 gates. Program elements such as Rental Car, Domestic Terminal, Baggage Claim, Concessions and International Terminal will need to expand along with these gates to meet the population demands. The program indicates that the airport will need to double in size to meet the overall future demand.

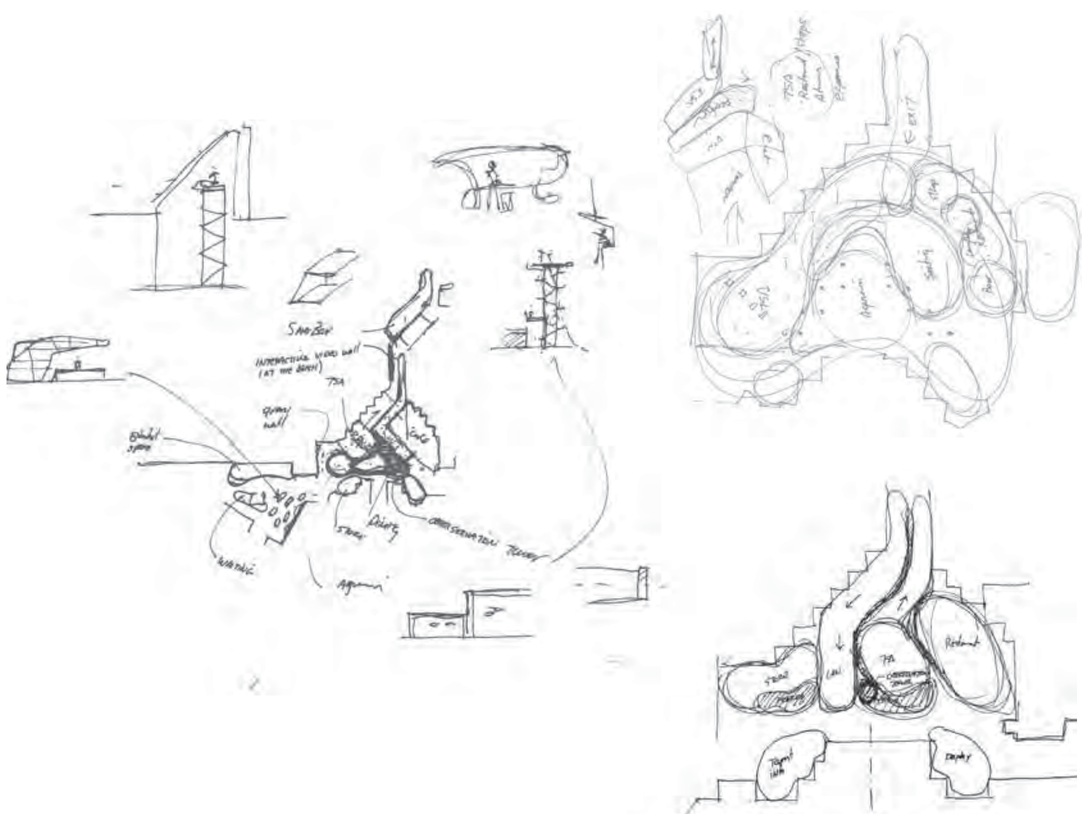
2035 Phase 3 Option

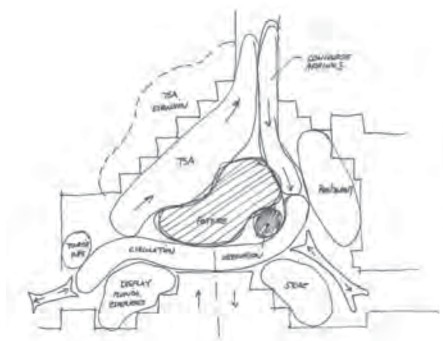
Phase 3 Option provides for a development scenario that accounts for a sustainable increase in international traffic the program proposes additional Federal Inspection Services facilities, as well as, additional International holdroom area and support facilities. One unique feature presented in this phase is the introduction of an outdoor passenger arrival experience at arrivals curbside. This will serve to introduce all passengers whether they are arriving on a domestic or international flight to the Melbourne Experience and welcome them to the greater Brevard Area.

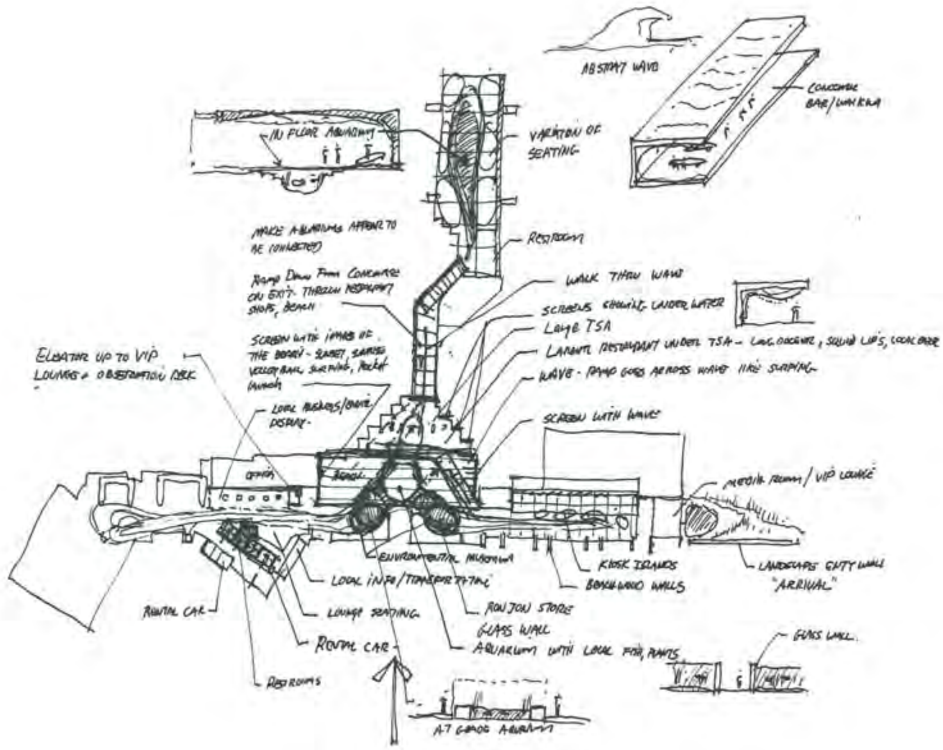
Design Process

The goal of our design process is to explore the possibilities of the project in the development as an airport for the future of Melbourne. This book is meant to inspire and explore the design opportunities of the Melbourne Airport. BRPH kicked off this effort by gathering together in-house experts for a design charrette. In our design charrette the team looked at benchmarking, brainstormed ideas, sketched out diagrams, and developed approaches. Ideas were explored and evaluated on their ability to provide a future vision while maintaining an economic approach. Once we established various masterplan approaches we focused our attention on the transformation of the airport interior.

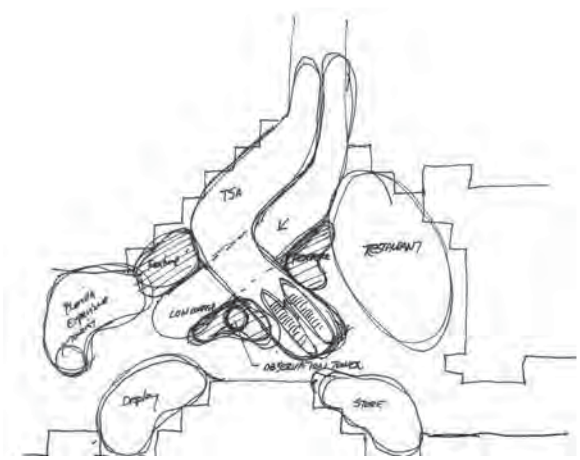
From our building experience we began to lay out a concept plan for the future building. This plan would provide flexibility, economy and opportunity within the facility. From the concept plan we developed a program and began to diagram potential areas. Lastly, we looked at the Architectural potential of the exterior of the building. Aligning with the current design and a modern "Florida casual" feel, we started to establish the terminal transformation approach. The design sketches, diagrams, programs and renderings represented within this book is our process. The goal was to explore opportunities and start a dialogue on design potential of the project.

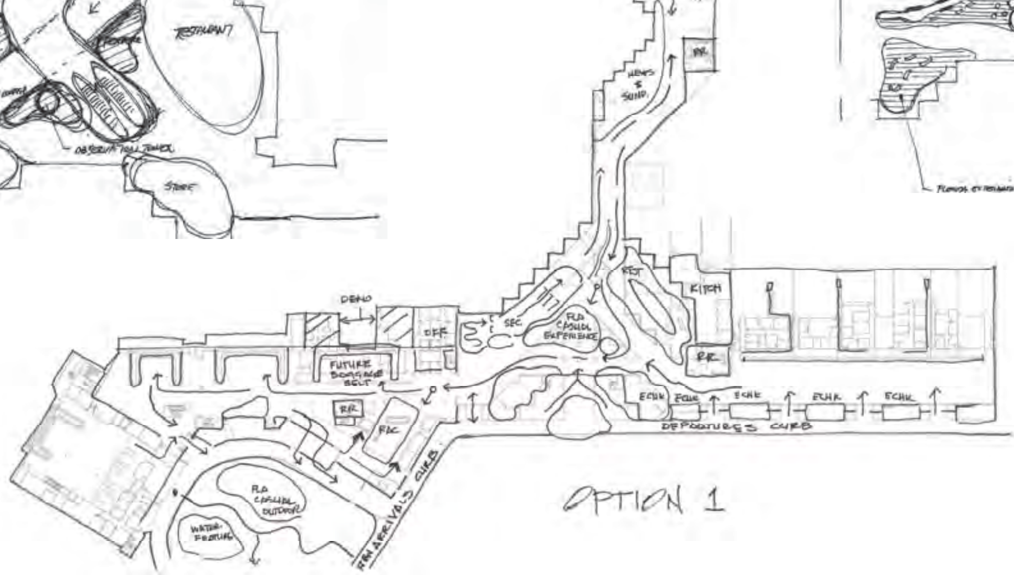


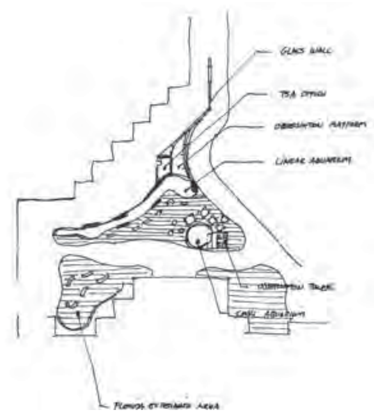




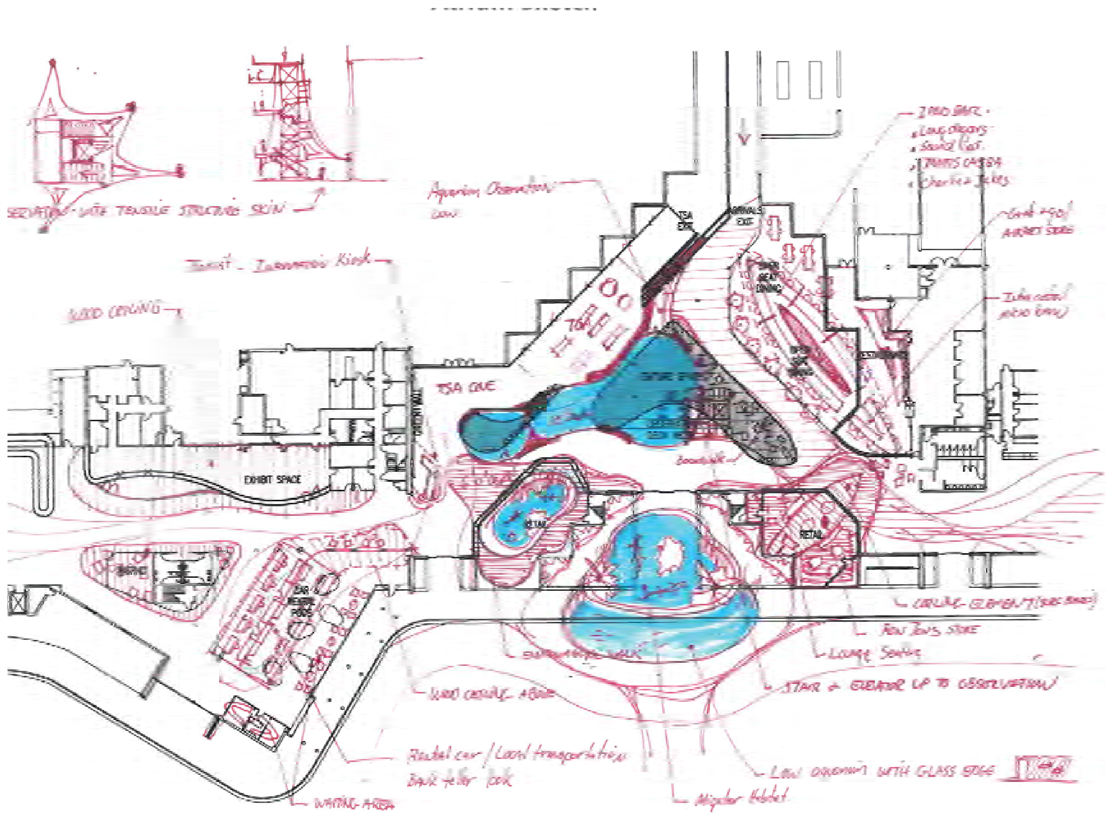
Concept Sketches







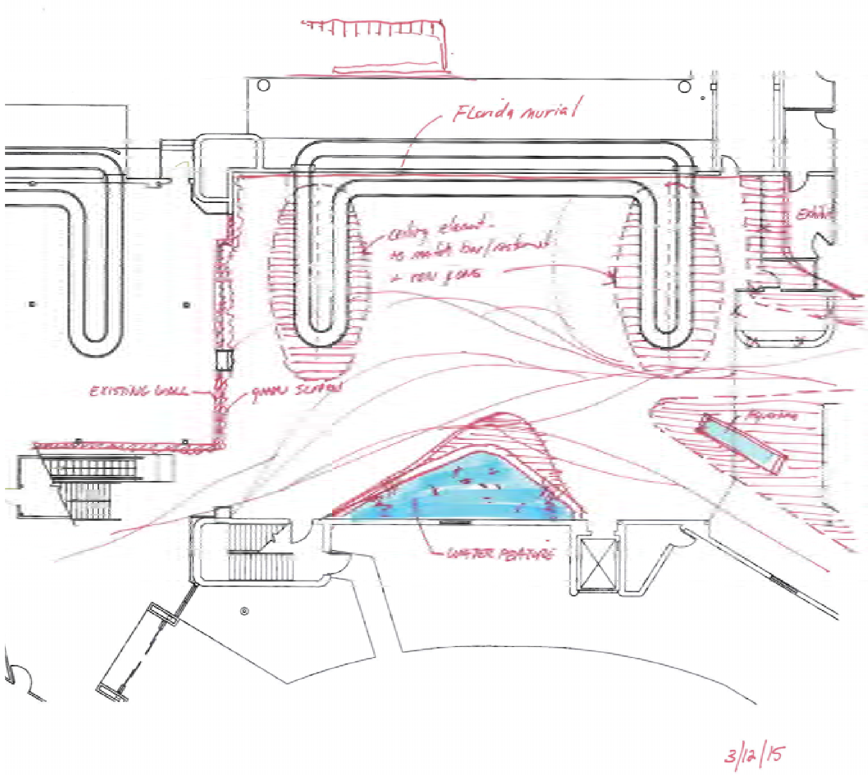
Atrium Concept

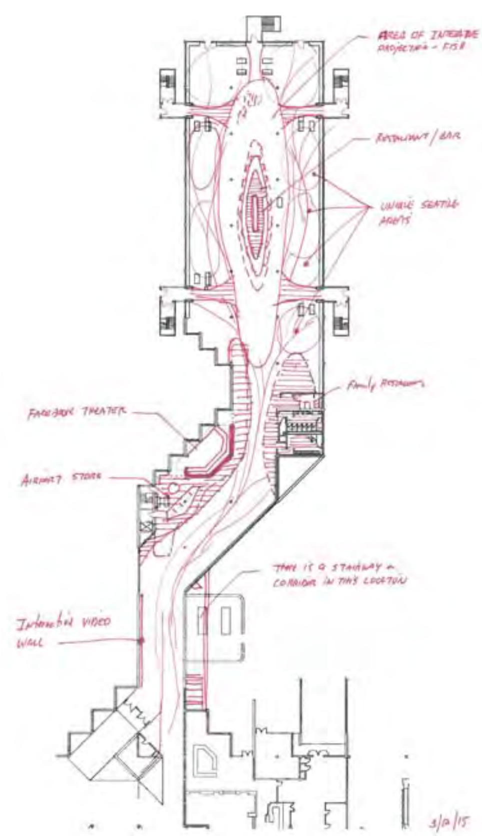


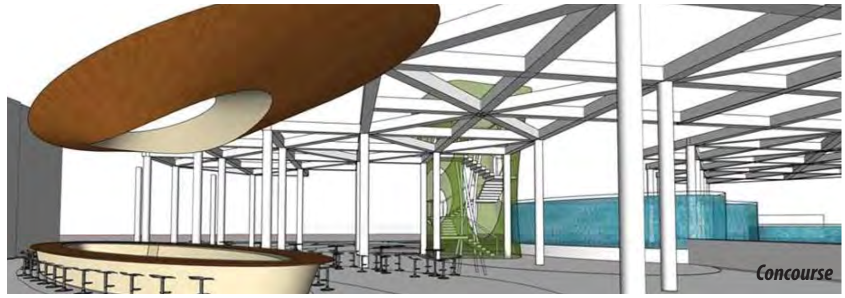
CASUAL THEME

The goal was to transform the space as a destination experience and to improve the visitor and passenger experience within it. The central feature of the Atrium is a clear acrylic walled Aquarium. The goal of the aquarium is to emulate the Indian River Lagoon with a sandy bottom, rock shoals, red mangroves and local aquatic species. Adjacent to the aquarium is an observation tower that rises up within the space into the skylight providing views out over the concourse and surrounding grounds to observe inbound and outbound flights. Adjacent to these elements are restaurants, retail and museum areas. These elements are designed to draw visitors in and provide a relaxed passenger experience. Multiple viewing opportunities throughout the space inform guest on the local area and show how to engage it. The plan has been reworked relocating TSA to the north side of the aquarium with views out the north facing glass. This provides for an enhanced, secure and scalable environment that is screened from view by the aquarium. The exit from the concourse has been relocated to the east utilizing the restaurant and a waiting area.

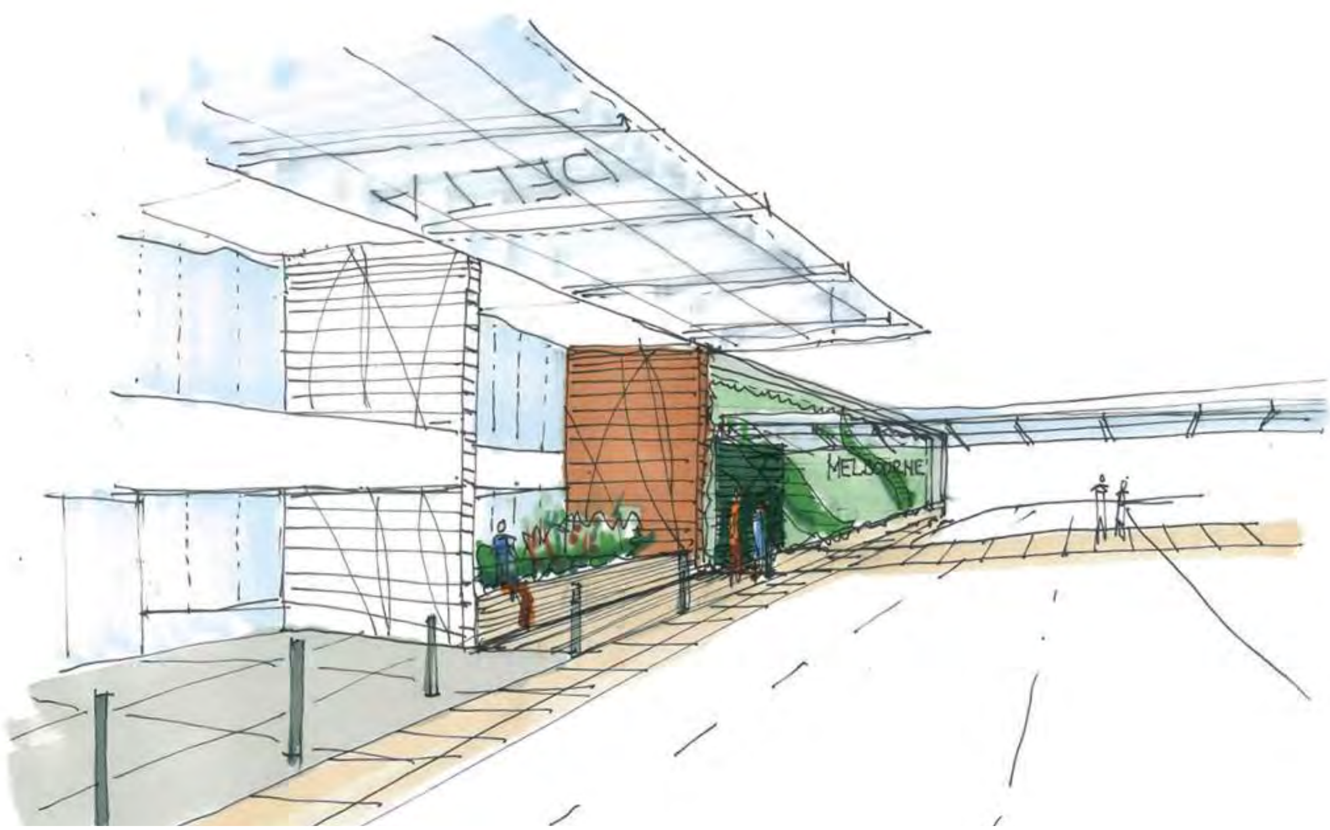
Baggage Claim & Concourse Concepts

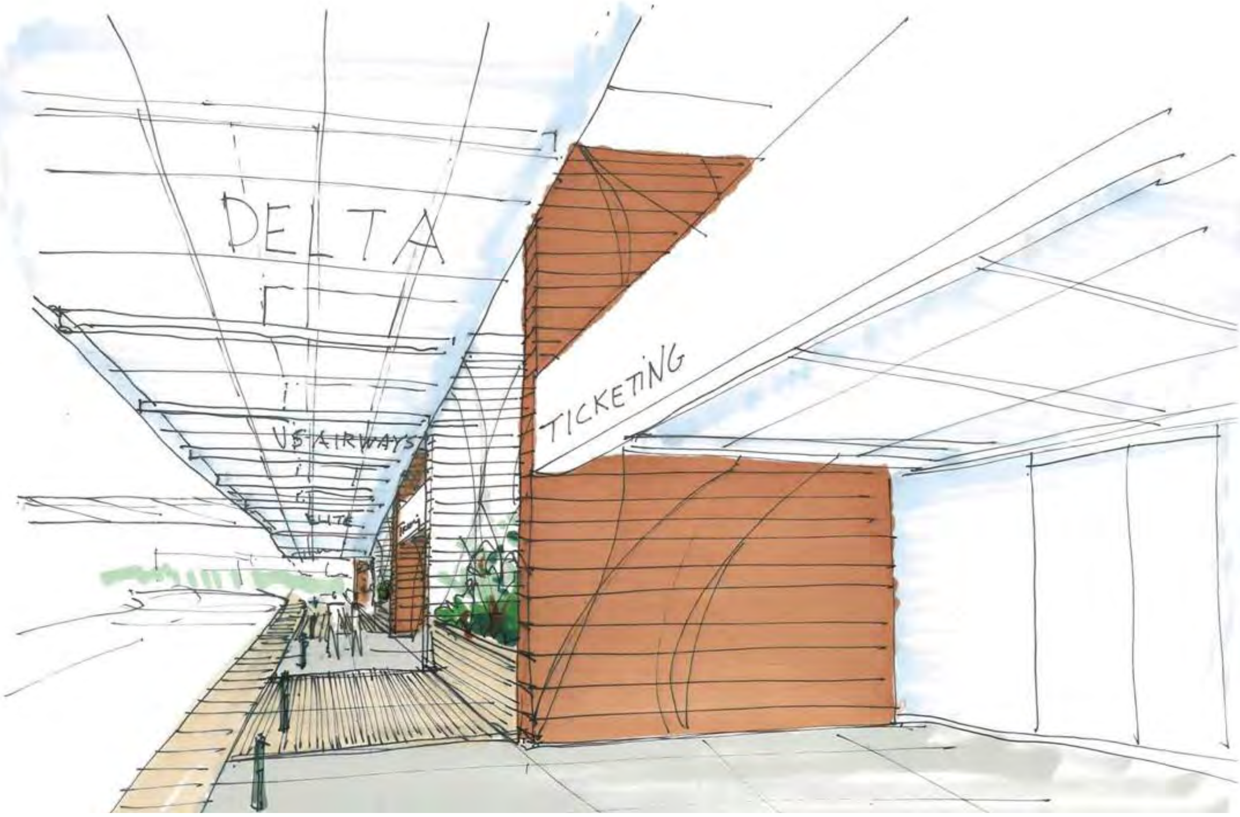






Curbside Concept



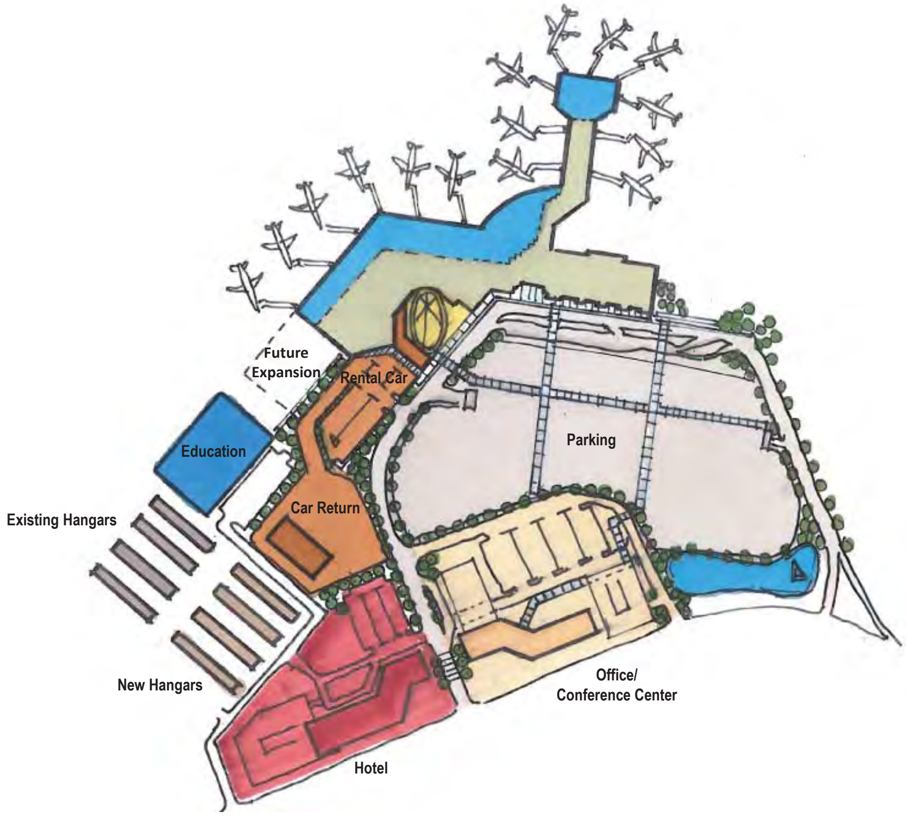


Site Analysis / Phasing

A site analysis was performed to look at the opportunities and challenges of the site. This analysis looked at the terminal and the surrounding property. The design team looked at the following areas:

- Entry/Exit off NASA boulevard
- Curbside - departures and arrivals
- Terminal entry points
- Terminal expansion opportunities
- Rental car and rental car return
- Out parcels for Hotel, Conference Center, Office, Education, Aviation Storage.
- FAA building height requirements
- FAA Building setback requirements

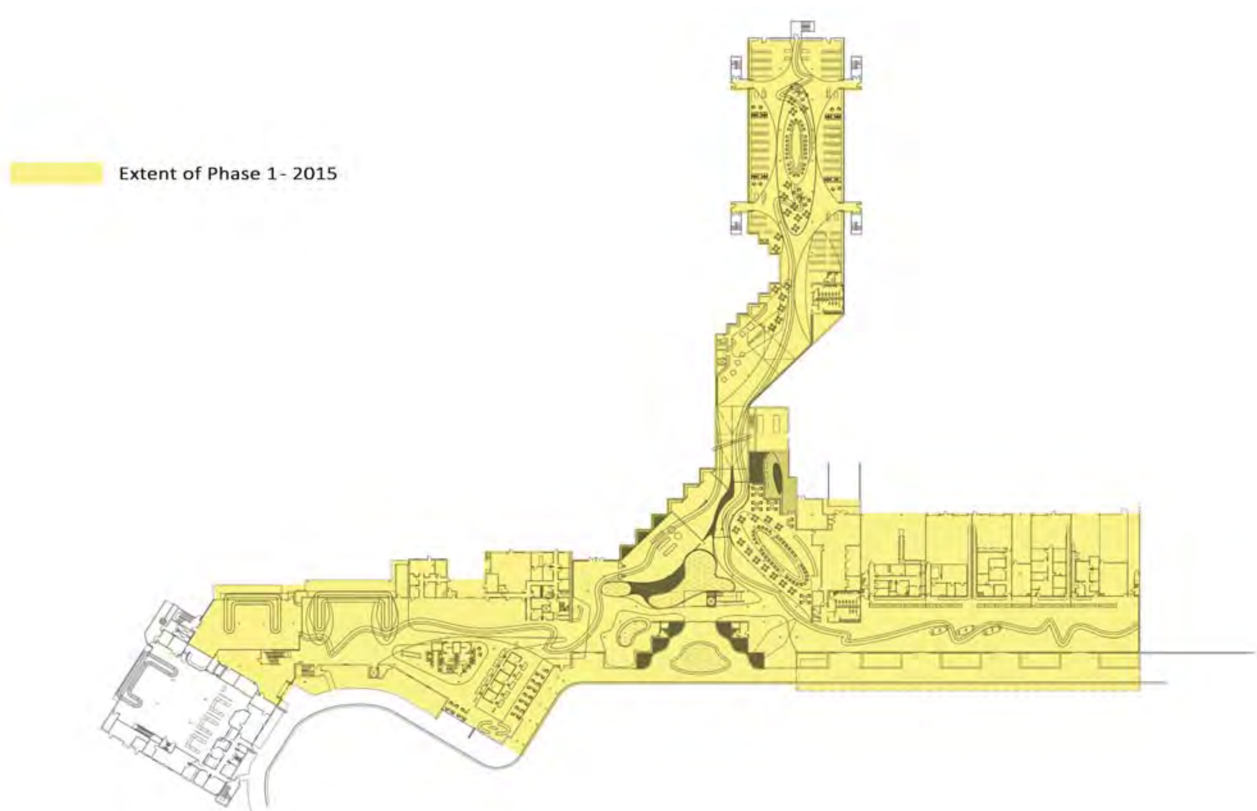
With a greater understand of the site and its functionality, the design team began to develop site concepts. This effort culminated in the adjacent Concept Master Plan.



Master Plan

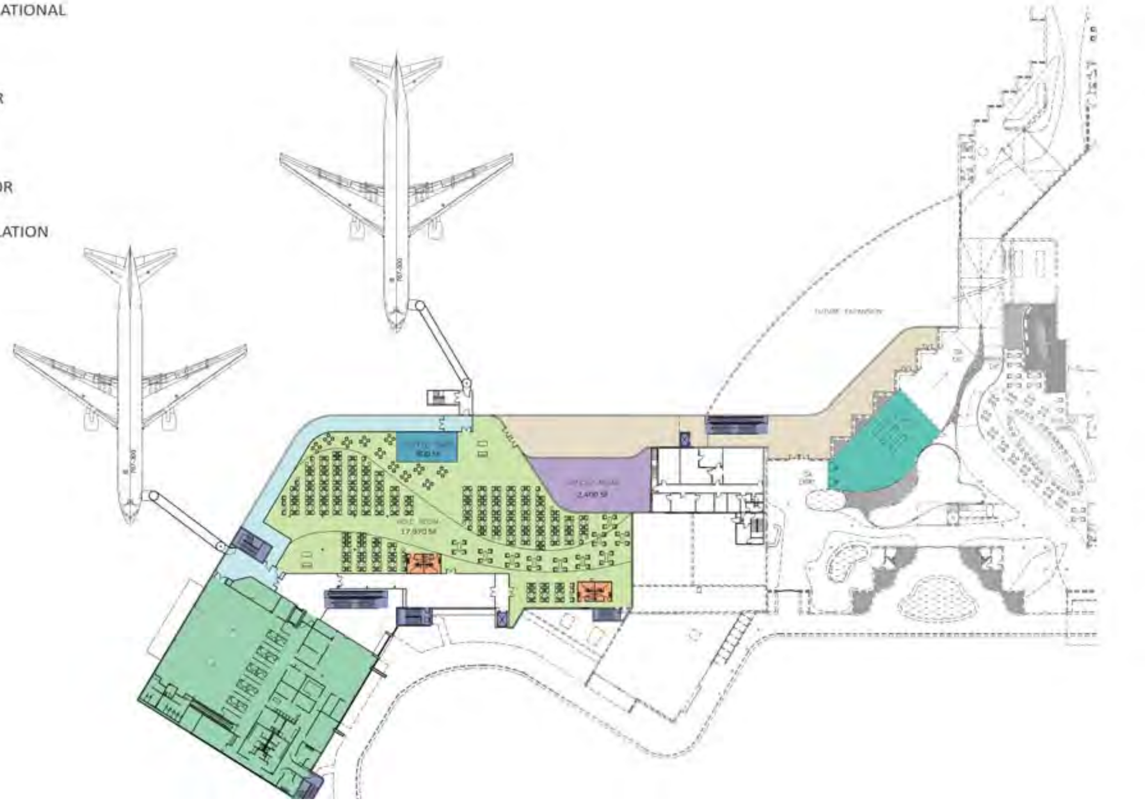
Based on the 2035 Program analysis the design team looked at the airport masterplan and how it would need to transform to meet the future needs. The adjacent concept plan shows how terminal components could be relocated and expanded to provide for an improved passenger experience. It also indicates how the area could evolve to achieve the highest and best use of the site. With the terminal expanding north for domestic and west for International the surrounding plan needs to grow along with it. The international terminal can grow to the south. A new entrance courtyard can be incorporated to better greet arriving and departing passengers. Rental car can be relocated adjacent to the international terminal near the rental car lot, car return and the car prep area. This area is easily accessible from the terminal. Removing the rental car element from its current location along NASA boulevard frees up out parcels to be used for potential hotels, offices and a conference center. Along the flight line new education facilities can be incorporated along with additional plane storage. Upgraded and extended curbsides and additional canopies with in parking area complete the design enhancements for the site.

Phase 1 Plan



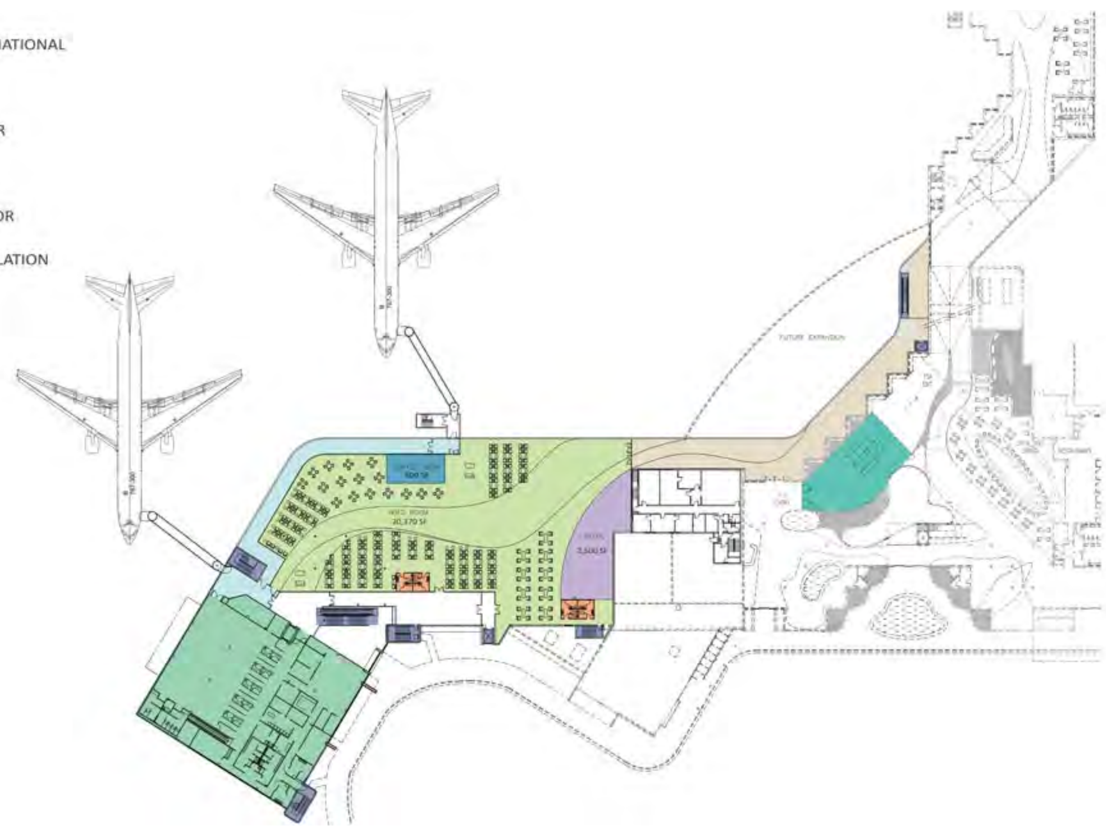
International Interim Terminal Expansion - Phase 1.5 - Option 1

EXISTING INTERNATIONAL TERMINAL
TSA
ENTRY CORRIDOR
HOLD ROOM
STERILE CORRIDOR
VERTICAL CIRCULATION
RESTROOMS
RETAIL
COFFEE SHOP

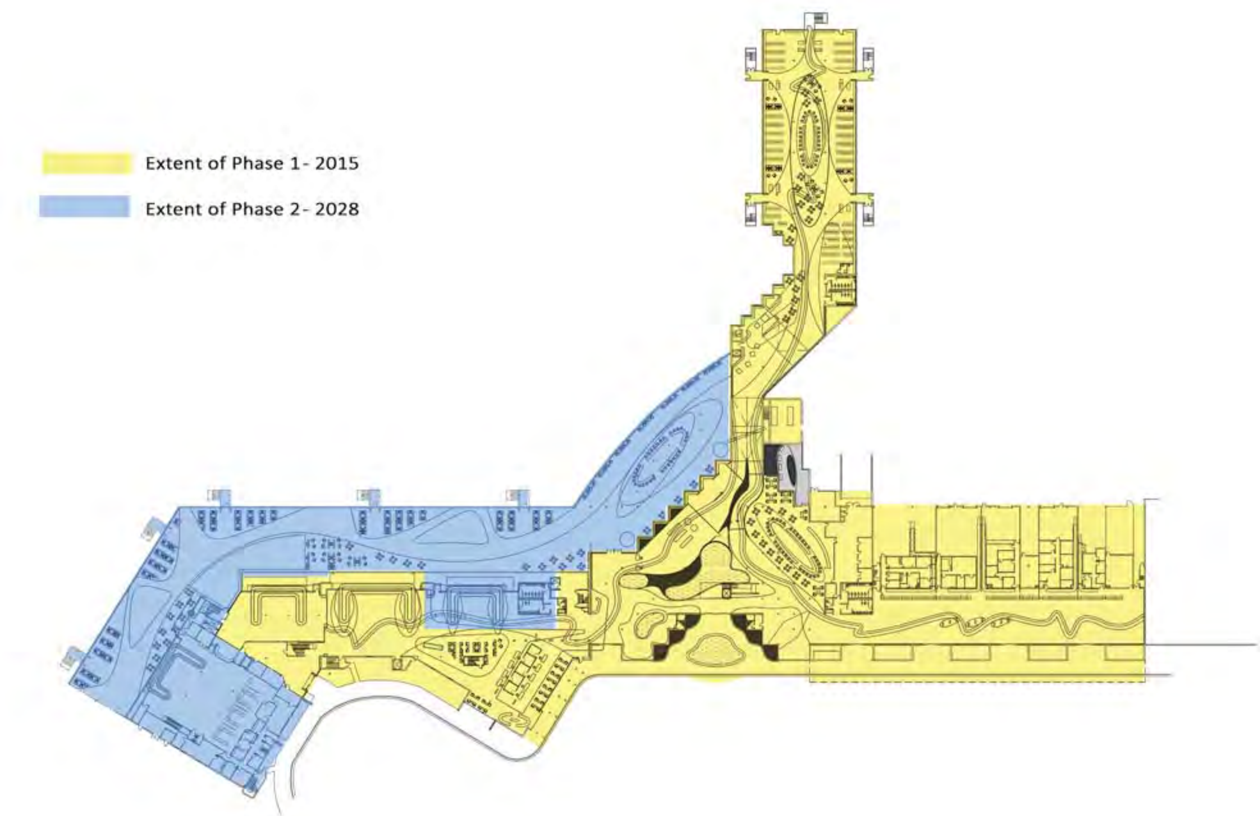


International Interim Terminal Expansion - Phase 1.5 - Option 2

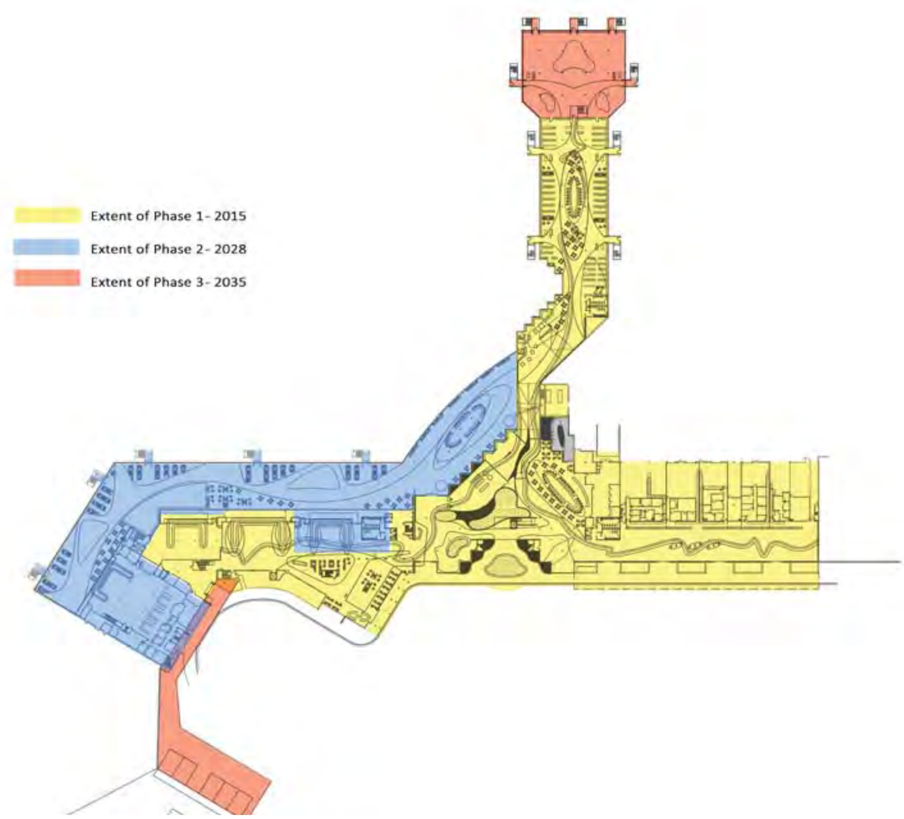
EXISTING INTERNATIONAL TERMINAL
TSA
ENTRY CORRIDOR
HOLD ROOM
STERILE CORRIDOR
VERTICAL CIRCULATION
RESTROOMS
RETAIL
COFFEE SHOP

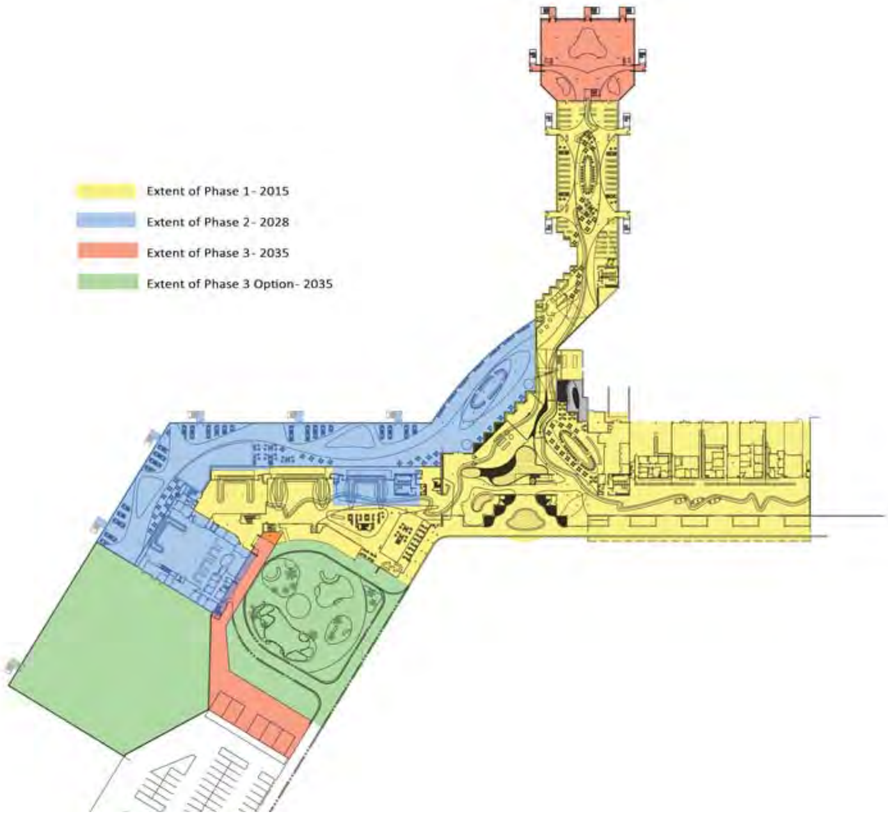


Phase 2 Plan



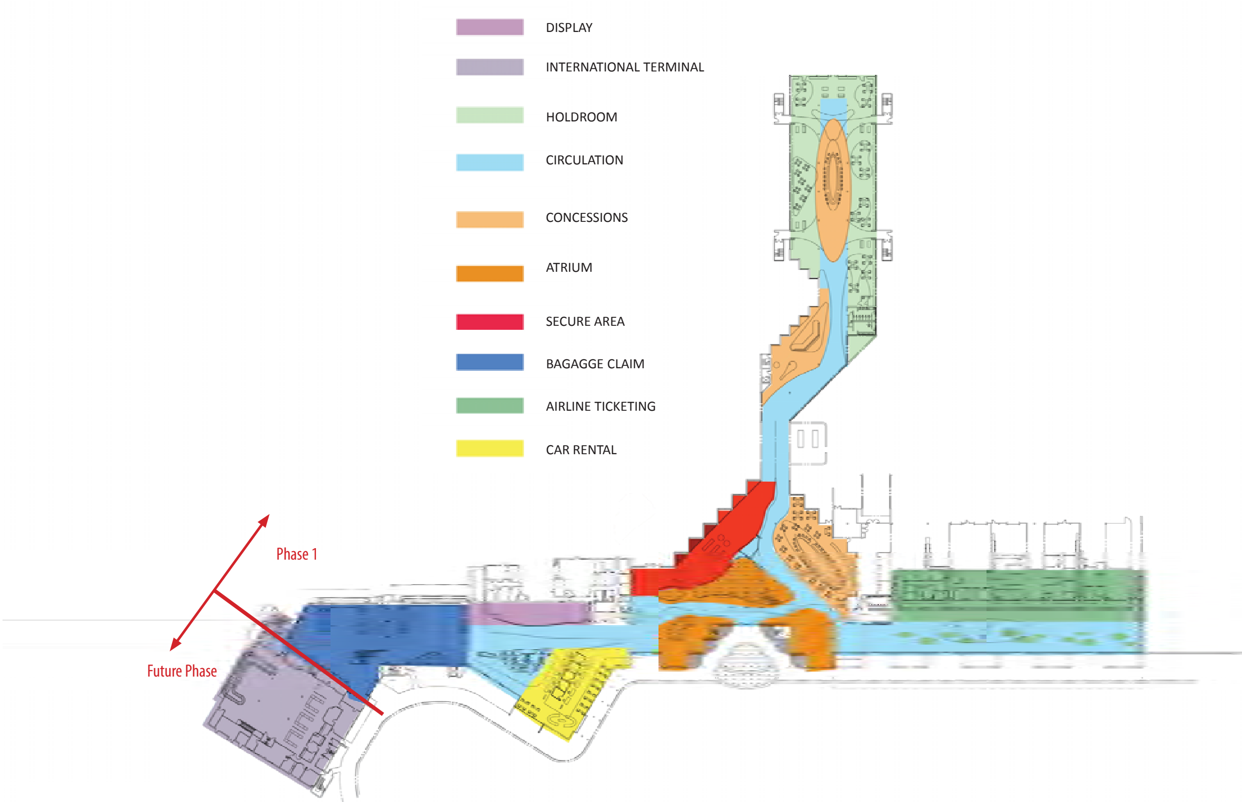
Phase 3 Plan

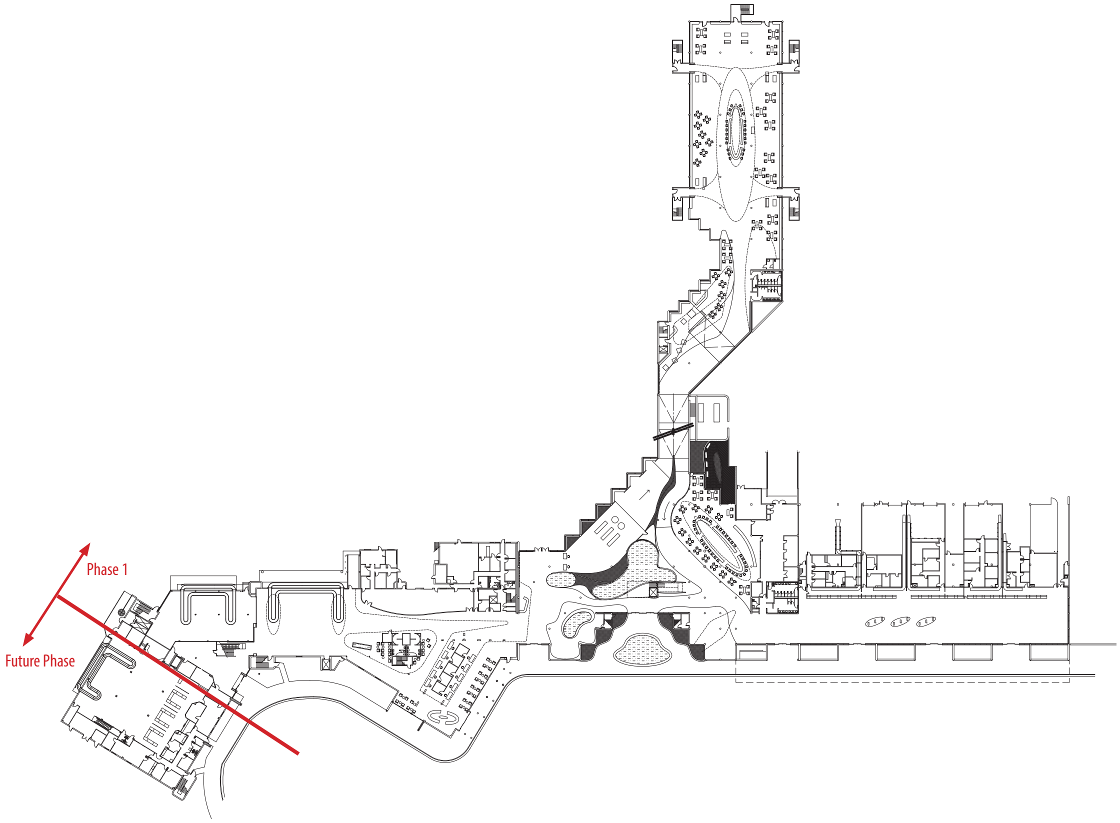




2035 Aircraft Layout Plan

Phase 1 - Design Elements





Concept Plan & Renderings

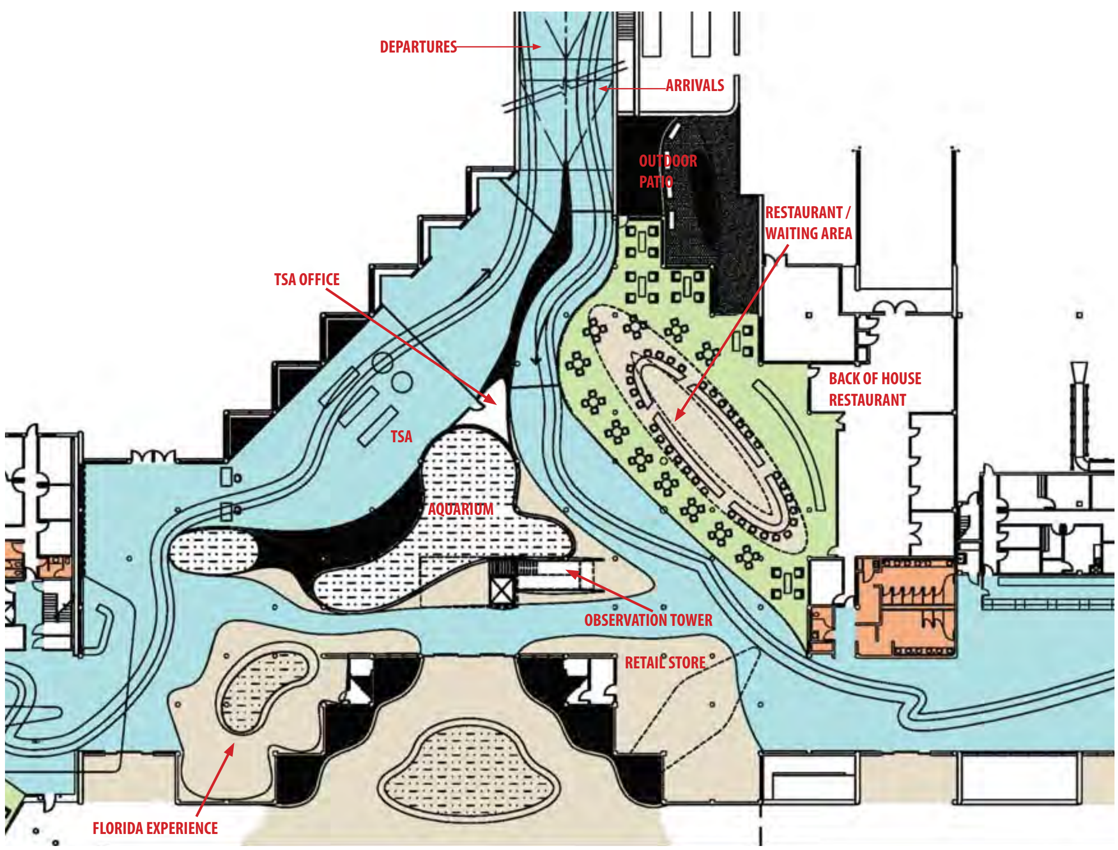
PHASE 1

The theme of Florida Casual progresses through the interior with warm natural materials, vibrant colors, unique accents and signature lighting. The concept focuses on creating a memorable environment that is light, airy, and casual with a modern feel. Materials were selected to create a calm and comfortable space with the use of multi-color Terrazzo and carpeting, wood ceilings, accent wood tiles, colorful panels and modern furniture. The finishes are presented in three zones throughout the airport:

- Off Shore - for the concourse,
- Mainland - for the Atrium, Ticketing and Baggage Claim
- Sunrise - for the office areas

Atrium Concepts

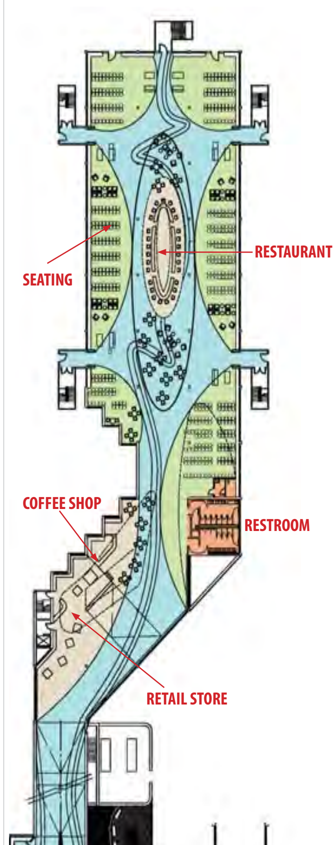
The atrium is the center piece of the Florida casual theme. The goal was to transform the space as a destination experience and to improve the visitor and passenger experience within it. The central feature of the Atrium is a clear acrylic walled Aquarium. The goal of the aquarium is to emulate the Indian River Lagoon with a sandy bottom, rock shoals, red mangroves and local aquatic species. Adjacent to the aquarium is an observation tower that rises up within the space into the skylight above providing views out over the concourse and surrounding grounds and observe inbound and outbound flights. Adjacent to these elements are restaurants, retail and museum areas. These elements are designed to draw visitors in and provide a relaxed passenger experience. Multiple viewing opportunities throughout the space inform guest on the local area and show how to engage it. The plan has been reworked relocating TSA to the north side of the aquarium with views out the north facing glass. This provides for an enhanced, secure and scalable environment that is screened from view by the aquarium. The exit from the concourse has been relocated to the east utilizing the restaurant and a waiting area.

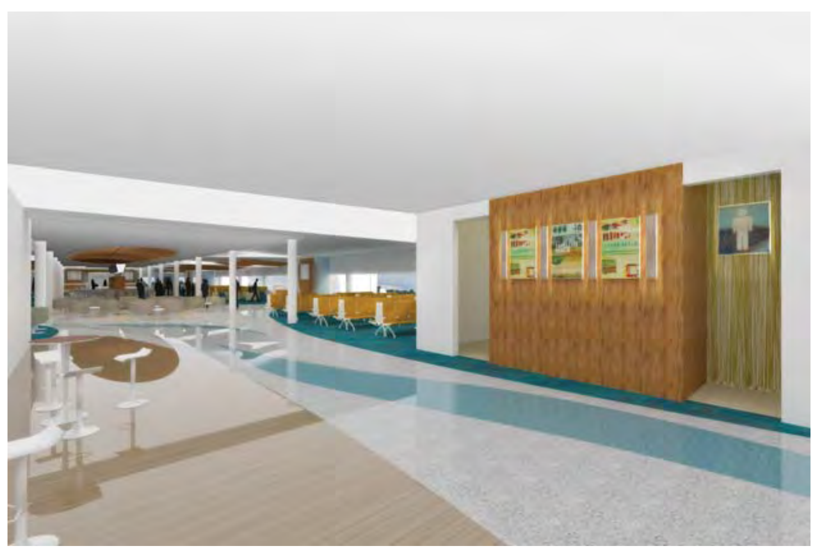



DEPARTURES

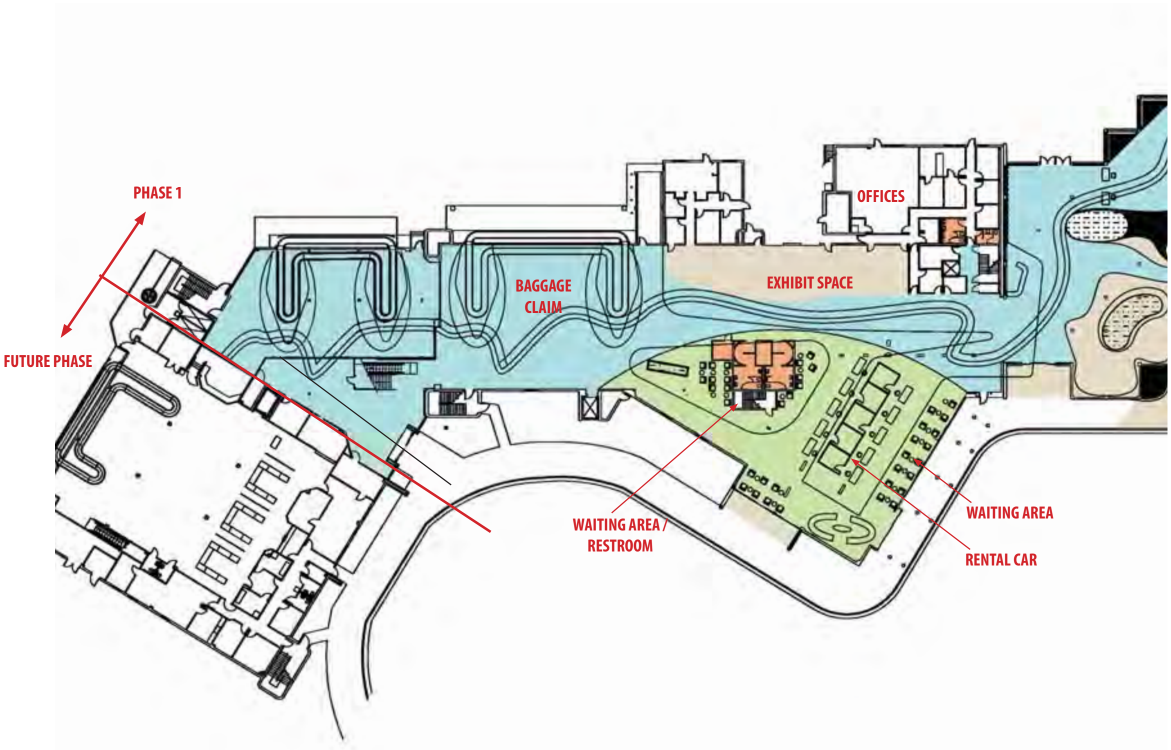
Concourse Concepts

The Concourse plan will be rework relocating the restaurant to the central part of the concourse to encourage use and provide enhanced convenience. The existing restaurant space will be converted into a Hudson News like magazine, sundry and coffee shop. Seating within the space will be updated creating a variation of environments. Flooring will be updated to Terrazzo and carpet. The cove ceiling will re-worked into an ellipse and trimmed out in wood.






Melbourne News



Baggage Claim / Rental Car

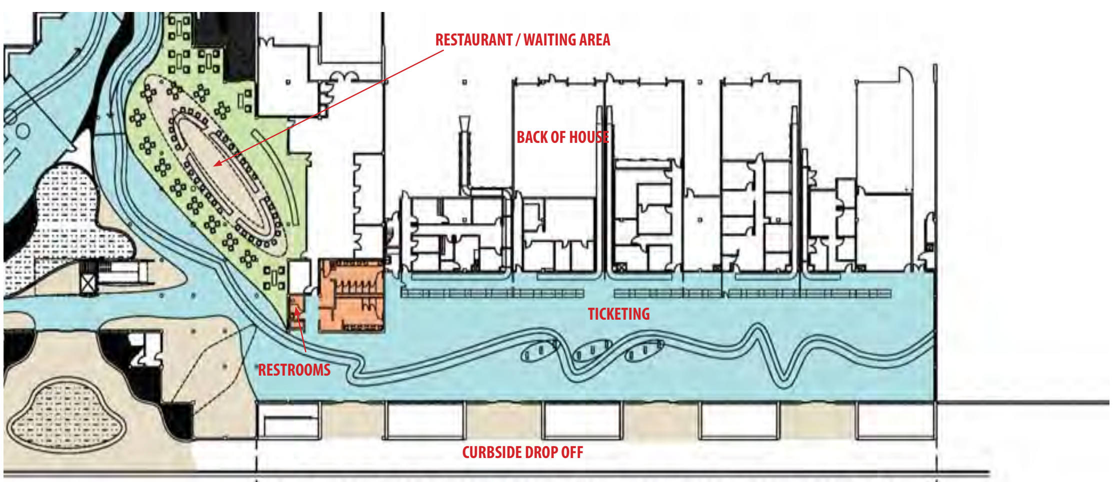
The Baggage Claim/Rental Car area will be reworked. The existing rental car counters and offices will be removed. In place of the rental car counters, on the North side of the space, will be an exhibit space. On the east side the plan will be reworked to provide eight smaller counters with access from both sides. Finishes will be upgraded with new multicolor terrazzo floors, accent carpet, liner acoustical tile ceilings with recessed linear light fixtures, accent ceiling features, a vegetated wall, and updated furniture.

Baggage Claim / Rental Car Rendering

Baggage Claim / Rental Car Rendering

Ticketing Concepts

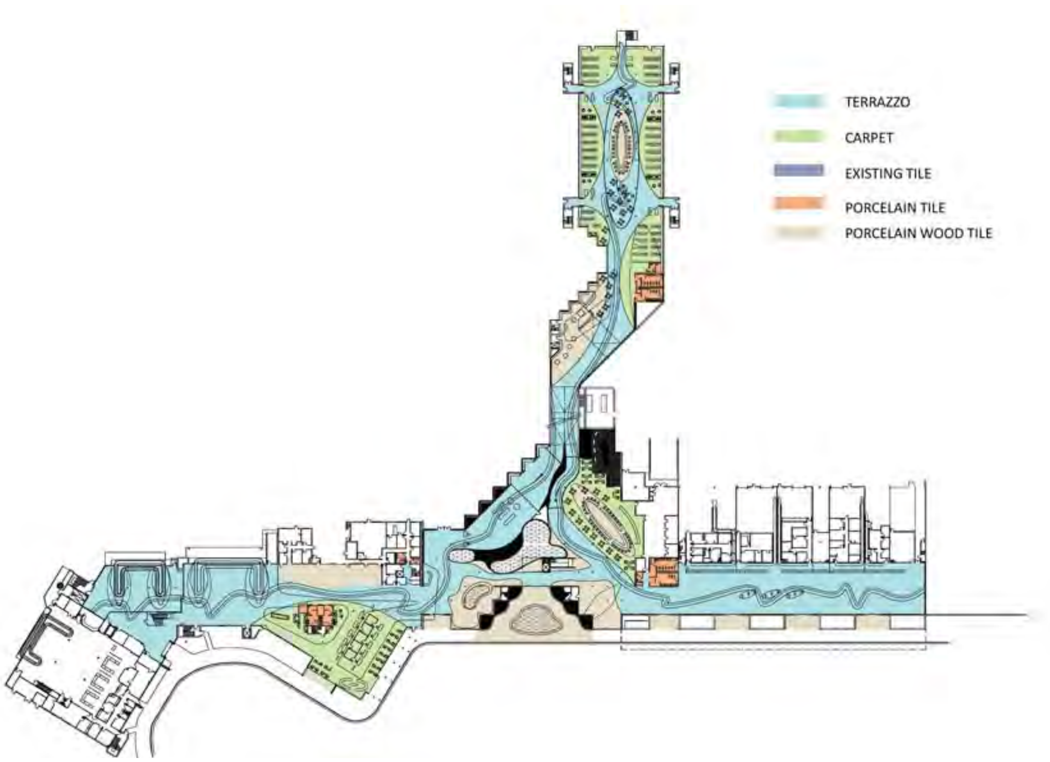
Ticketing will receive a refresh with a new terrazzo floor, repurposed ceiling baffles – painted to match wood accents, re-skinned counters and additional check in kiosks. Flat screens will replace airline signage and will allow for flexibility between the different companies. A waiting area with modern furniture completes the space and provides connection back into the overall environment.



Interiors

FINISH MATERIAL WORK SESSION

Melbourne Airport and BRPH met to discuss finishes for the building. BRPH proposed three (3) schemes. During the meeting general concepts for the floor plans were discussed along with general finishes. The meeting was truly a work session, as all participants moved finishes around and discussed possibilities. Ultimately, the group decided to keep all three schemes and combined them as one overall theme. Each area will be well defined by its own characteristics. Ticketing and baggage claim will be assigned as the "Mainland", the concourse will be "Offshore", and the office area will be "Sunrise at the Beach". All three (3) schemes work together very well, creating a nice flow and working as wayfinding.



Finish Material Selections

To begin the work session, general finish materials, their use and maintenance were reviewed. There are many different areas of a building that require an array of flooring materials. Some areas benefit from a more durable hard surface material, such as ticketing, baggage claim, and areas in the concourse where there is high volumes of traffic. BRPH is proposing the use of terrazzo flooring in these areas. Terrazzo is a sustainable product that achieves a beautiful aesthetic and is LEED certified should LEED accreditation become a requirement. Carpet tiles will be provided mainly in waiting areas. The carpet tiles have been selected to achieve a modern, warm feel, as well as durability and cleanability. Other areas like shops and bars/ restaurants will have wood luxury vinyl tile. The wood luxury tile selected is a commercial grade product that will provide a modern look that coordinates with the coastal aesthetic. The product has acoustical properties and is known to hold up to the heavy us of rolling luggage and customer traffic. Paint color and decorative 3-Form elements play a large part in the overall design. All of these elements combined will transform the airport into a "Florida Casual" environment; a fresh and relaxing environment for people of all ages.

Interior Finishes

This section documents the schematic finish and material directive for the Melbourne Airport renovation at the conclusion of the work sessions. We also identified the interior opportunities for architectural detailing and possible furniture locations. The following areas are included:

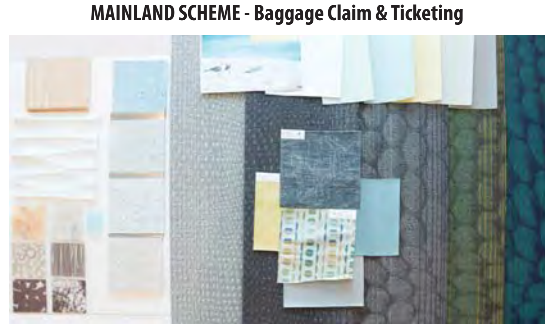
- Concourse
- Ticketing
- Atrium
- Baggage Claim
- Rental Car
- Cafe/ Restaurant
- Retail Store

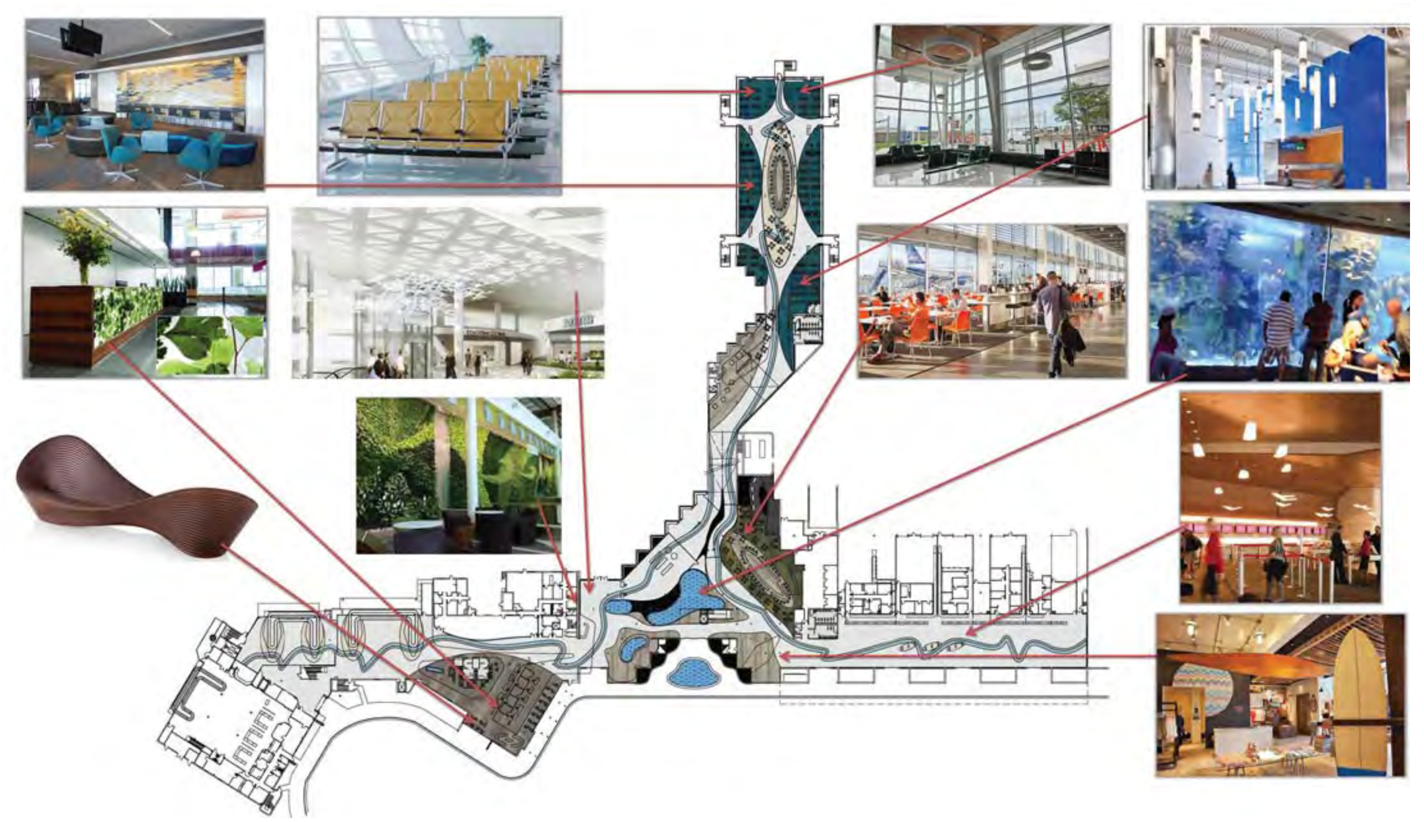
FRESH SCHEME - Restrooms & Miscellaneous

OFFSHORE SCHEME - Concourse

SUNRISE SCHEME - Office

MAINLAND SCHEME - Baggage Claim & Ticketing





Floor Pattern Studies

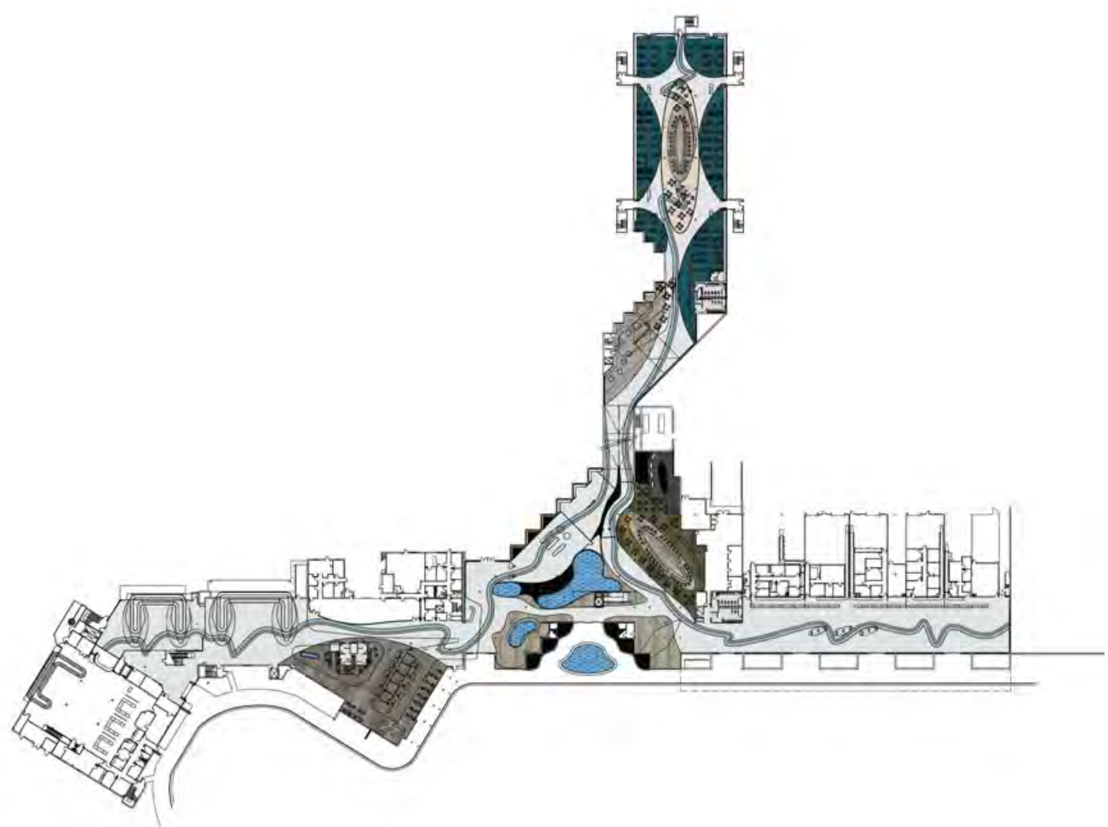
As a follow up to the finish material work session, a floor pattern study have bee developed. As the project progresses additional studies will be presented to the client for input.

The floor pattern concept has a wave-like design that works with the architecture of the building and relates to the "Florida Casual" theme for the master plan.

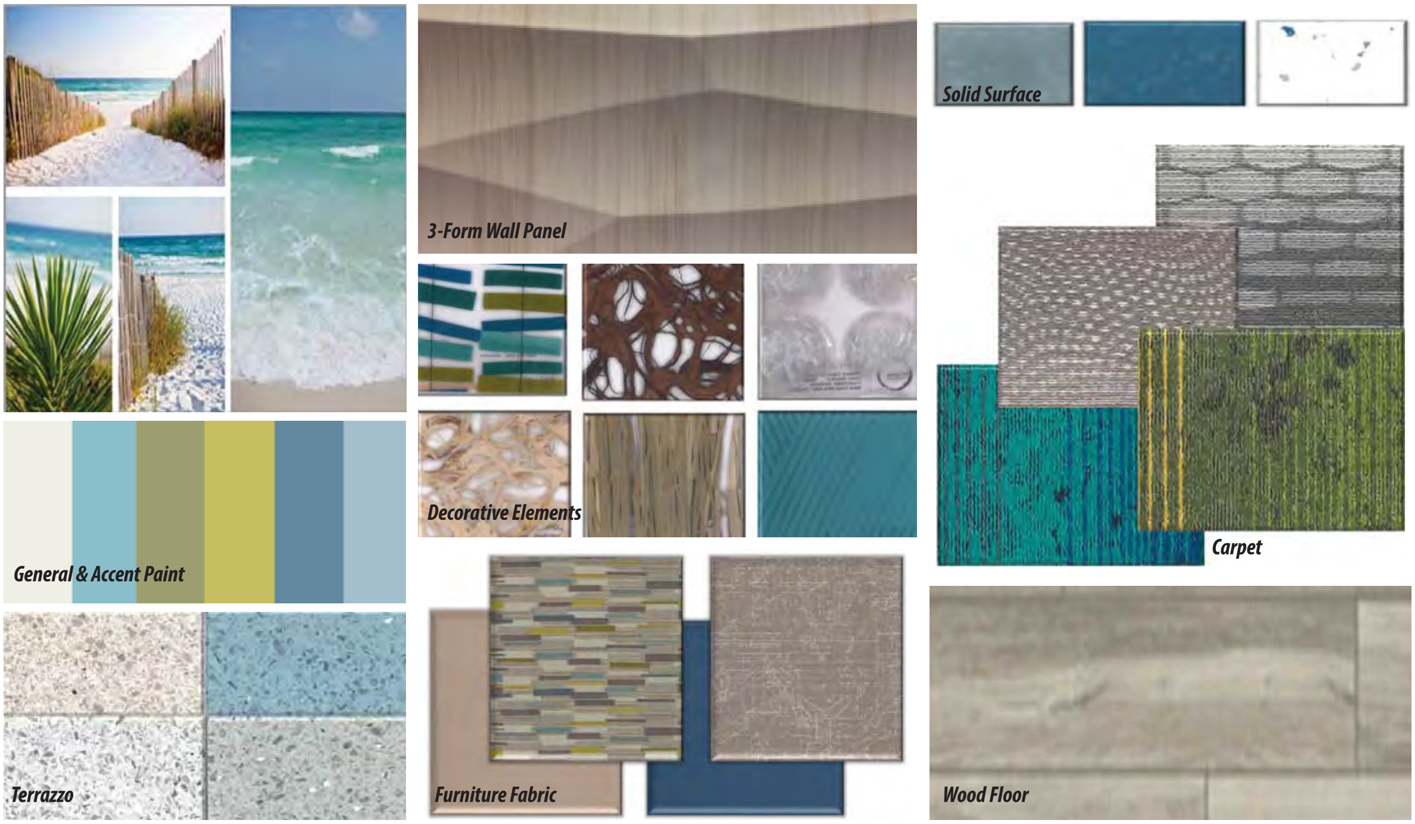
The main concept is to bring the outside in and provide a "Florida feel" from the moment people enter the airport.

Terrazzo will be used mostly throughout the airport, and will have a subtle pattern, which consists of four colors that are predominately found at the beautiful beaches of Melbourne. Carpet and wood luxury vinyl tile will also be utilized on areas where people will be gathering for longer periods of time. This variety of materials will help with acoustics and wayfinding to direct travelers to important core areas.

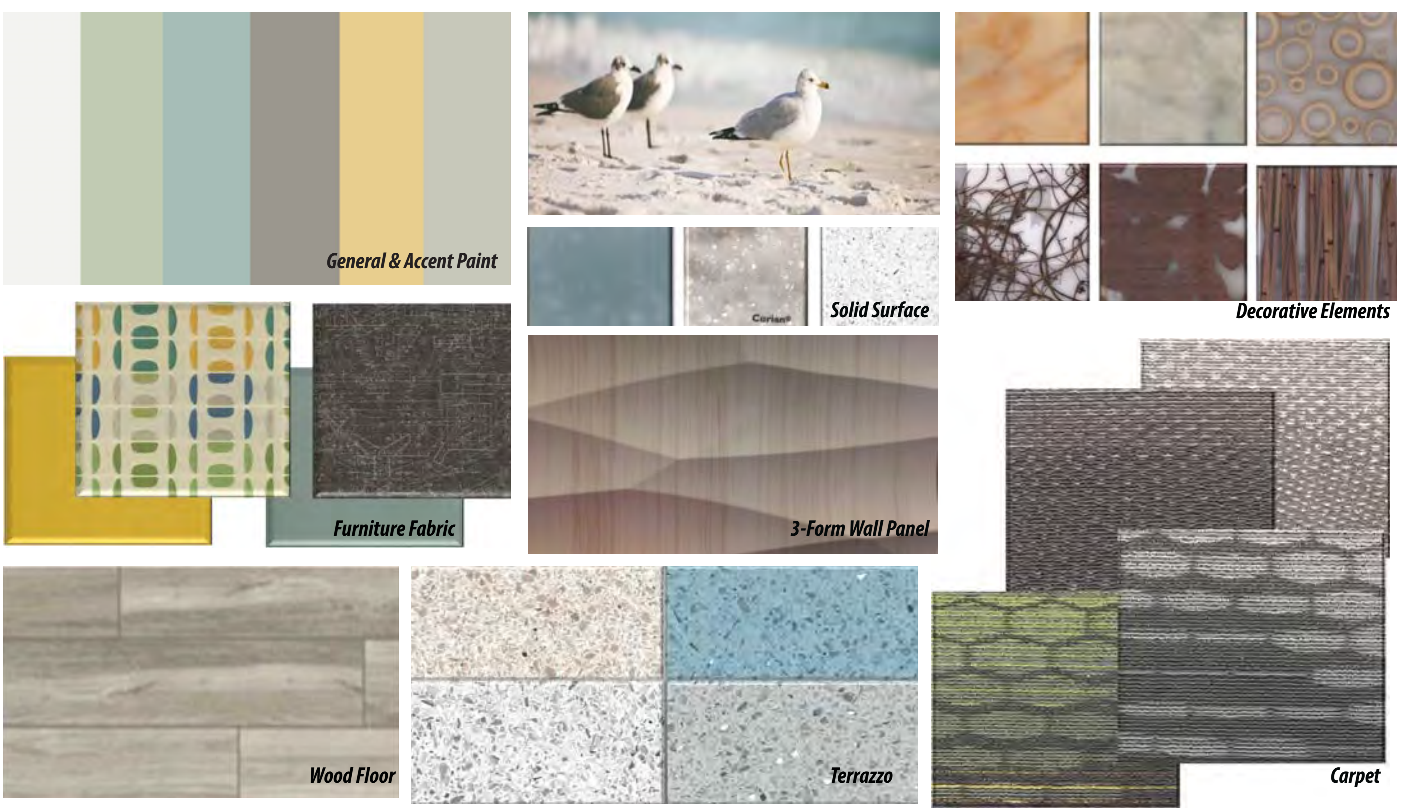
COLOR BOARDS
Computer generated color boards documenting each color scheme have also been provided and follow the Floor Pattern Study.

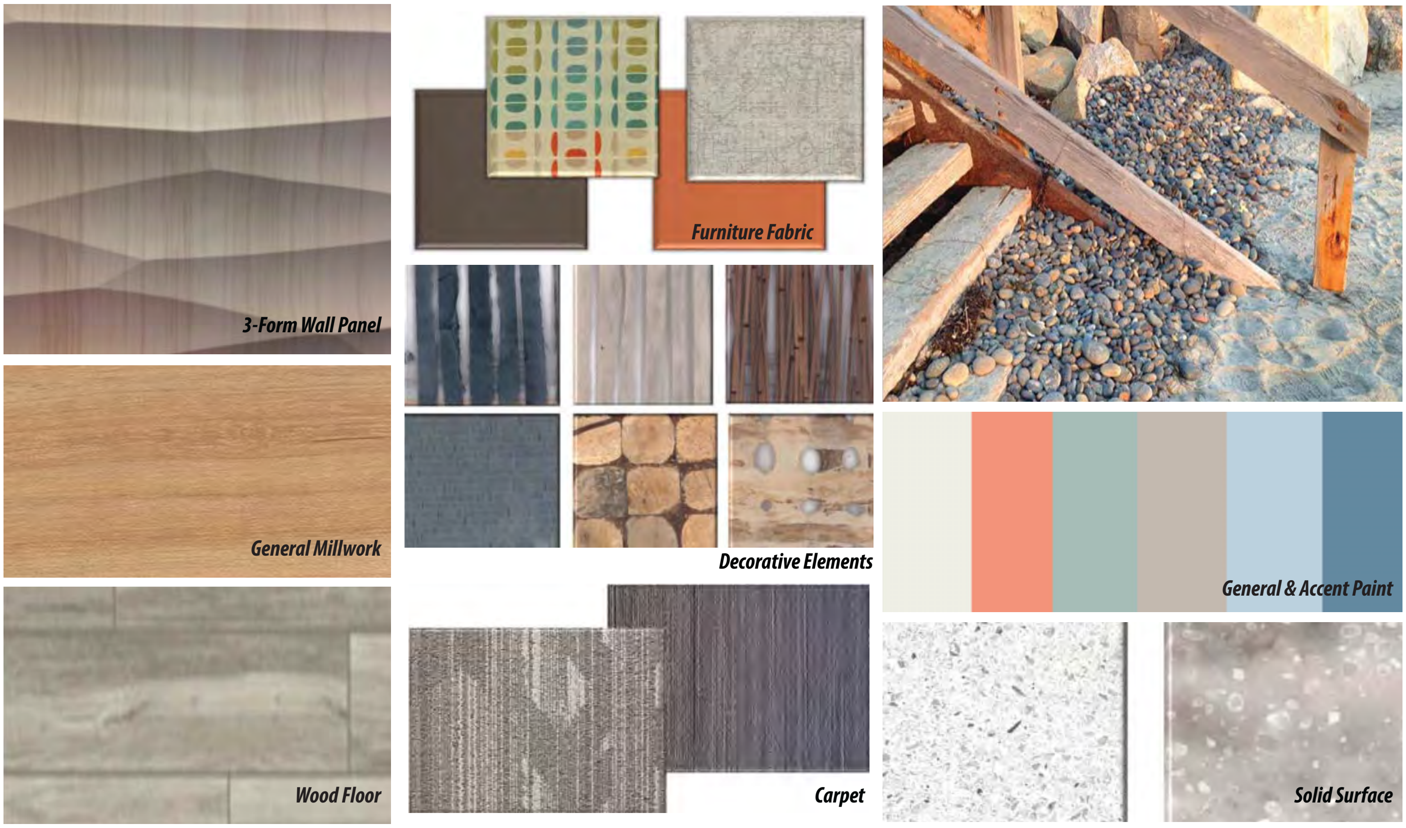


OFFSHORE - Concourse

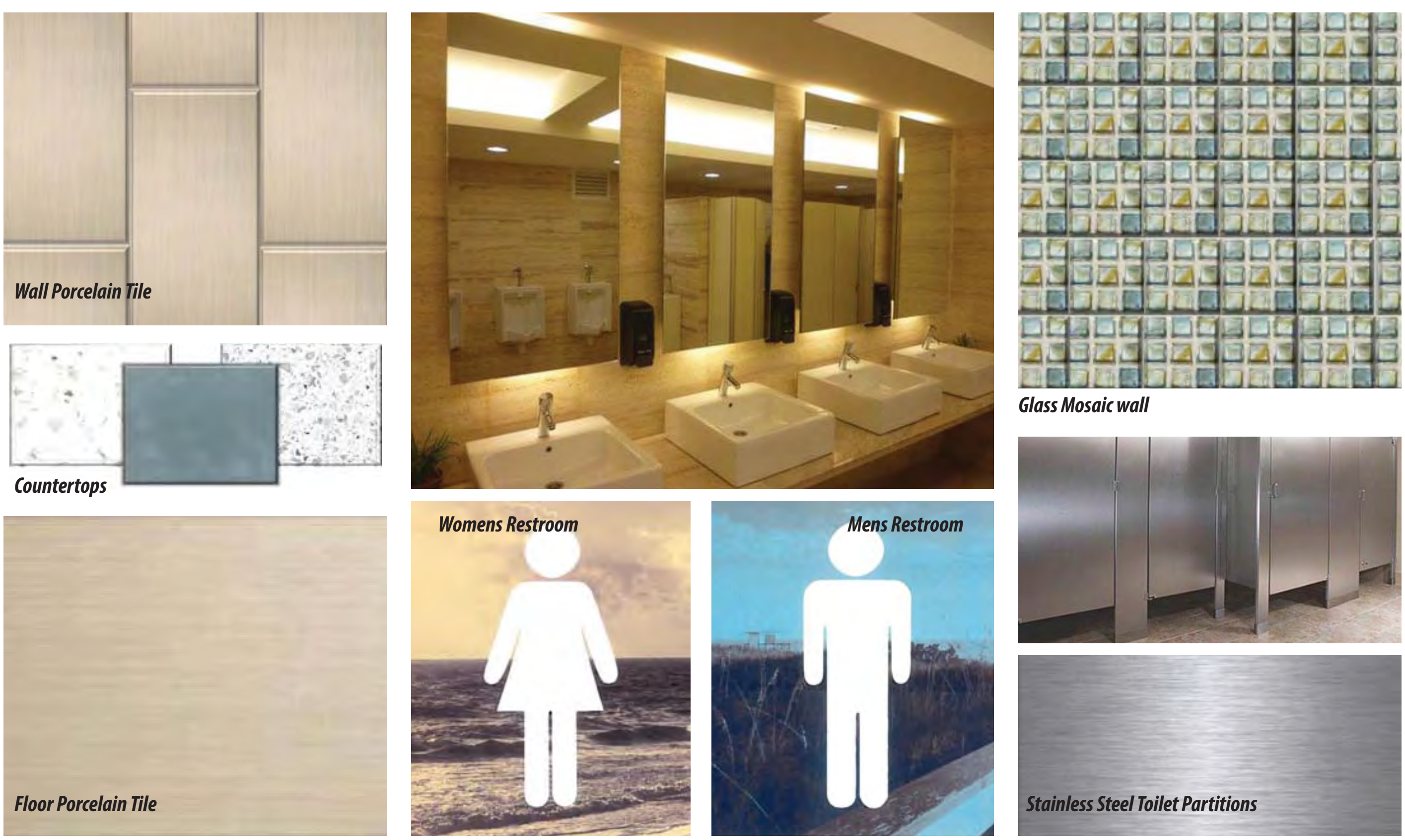


MAINLAND - Baggage Claim & Ticketing





Restroom Finishes



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FSC
Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber

CREATIVE IDEAS. PRECISELY DELIVERED.

APPENDIX C

Recycling, Reuse, and Waste Reduction Plan

1. Introduction

The *Federal Aviation Administration (FAA) Modernization and Reform Act of 2012* included a new requirement for Airport Master Plans to address recycling by:

- Assessing the feasibility of solid waste recycling at the airport;
- Minimizing the generation of waste at the airport;
- Identifying operations and maintenance requirements;
- Reviewing waste management contracts; and
- Identifying the potential for cost savings or generation of revenue.

Subsequent to the passing of the FAA Reauthorization bill, FAA issued guidance[1] on preparing recycling, reuse, and waste reduction plans as part of a master plan. The following section is organized, per the FAA's guidance, to provide detailed information regarding the management of Orlando Melbourne International Airport's (MLB's) waste and recycling program.

This Recycling, Reuse, and Waste Reduction Plan (RRWRP) includes a review of MLB's waste management and recycling throughout the terminal and airfield, as well as a review of tenant practices. To provide transparency, the section numbering in the remainder of the document corresponds with the FAA's *Guidance on Airport Recycling, Reuse, and Waste Reduction Plans*.

A Facility Description and Background

A1 Background Information about the Airport

This RRWRP was developed as part of MLB's Master Plan Update. MLB owns a significant amount of property that is leased; however, for this study, the perimeter fence for MLB was considered the boundary for tenants. As described in greater detail below, MLB has limited control over off-airfield tenants.

A2 Scope of the Existing Recycling Program

The City of Melbourne does not mandate recycling; however, recycling services are provided. Presently, the City does not provide waste services for MLB, which incentivizes the airport to reduce their waste generation and associated expenses. Consistent with City practices, MLB recycles paper, plastics, aluminum, cardboard, and other materials.

A2(a) Facilities over which the airport has direct control of waste management

The airport has direct control over waste disposed of in the parking lots; public and Melbourne Airport Authority (MAA) space within the terminal (e.g., ticketing, concourses, gates, and office space); and the airfield, including deplaned waste. MLB cannot control sorting of recycling and waste on aircraft; however, MLB-hired contract ramp employees are responsible for taking the deplaned waste from the aircraft to the waste and recycling bins. Furthermore, it should be noted that the airline has to opt for recycling, which includes an additional fee.

[1] FAA. *Guidance on Airport Recycling, Reuse, and Waste Reduction Plans.* September 30, 2014. http://www.faa.gov/airports/environmental/media/airport-recycling-reuse-waste-reduction-plans-guidance.pdf

A2(b) Areas over which the airport has no direct control, but may have influence

MLB can influence tenants located within the airport terminal and on the airfield, as well as airlines. The majority of tenants utilize MLB-hired staff to dispose of waste and recycling; however, the airport has limited opportunities to encourage or increase recycling efforts.

A2(c) Areas over which the airport has no direct control or influence

The airport has no direct control or influence over off-airfield tenants, such as the Kindred Hospital, Tropical Haven, Rockwell Collins, etc. The only mechanism for control or influence would be in lease language, which is administered by the MAA.

A3 Existing Waste Management Program

The airport does not have a formalized program, but does conduct recycling activities throughout the terminal and airfield. Recycled materials at MLB primarily include paper/magazines, cardboard, aluminum, glass, and plastics. Tenants with direct airfield access from buildings outside the terminal make their own arrangements for waste management, as commercial customers under the City of Melbourne's franchise agreement for refuse services. That agreement does not include recycling services, which under Florida law cannot be exclusively franchised. However, as a matter of convenience, those tenants with recycling service use the franchisee for part or all of that service. Some also use independent service providers for scrap metal, construction and demolition debris recycling, and confidential document destruction and recycling.

A4 Drivers for Implementing/Maintaining a Recycling Program

The City of Melbourne does not provide waste and recycling to MLB; therefore, it has to contract with the franchisee for refuse disposal and through the open market for recycling services. One of the primary drivers for implementing and maintaining their recycling program is because the airport is subject to standard garbage rates, which provide an incentive to reduce waste. Additionally, providing recycling opportunities shows passengers and the general public/local community that MLB is an environmental steward.

A5 Recycling Infrastructure

Figure C-1 depicts the primary type of waste and recycling bins located throughout the airport terminal. Typically recycling bins are collocated with trash bins; however, there are many trash bins that are not located near recycling bins. MLB has a central location near its maintenance area where discards are collected, which includes two waste containers, one cardboard container, and nine recycling carts (see **Figure C-2**).

The local landfill (on Sarno Road) is located approximately three miles (northwest) of the MLB terminal.

The primary commodity markets in this area are for scrap metals, waste aircraft fuel, and wood; presently the airport and several tenants retain these materials for sale in the marketplace.

Currently, Waste Management, Inc. of Florida (Waste Management) collects traditional recyclables (cans, bottles, paper, cardboard, etc.) from the airport and many of its tenants, and those materials are processed in a Material Recovery Facility (MRF) in the Orlando area.

Figure C-1: Examples of Terminal Waste and Recycling Bins

Figure C-2: Examples of Waste Container and Recycling Carts

A6 Current Solid Waste Recycling, Reuse, and Waste Reduction Efforts

The airport and many tenants have unofficial recycling and waste reduction programs. As previously stated, the most common recyclables include paper, aluminum, plastics, and glass. Additionally, at least one tenant has an organics bin that is receiving food scraps and other

organic materials, and is currently in the planning stages for a pilot-study of an anaerobic digester system.

A6(a) The date recycling was initiated for various materials

The airport did not launch an official recycling program when recycling activities started; therefore, specific dates are not known. Comingled recycling (e.g., paper, plastics, and aluminum) started within the last 10 years, and cardboard recycling began more than 10 years ago.

A6(b) Recycled or reused material, with Quantities

Local waste haulers do not bill waste/recycling by weight (billing is based on number of weekly pick-ups and container sizes); therefore, annual volume/weight information is not known. From the airport itself, recycling is picked up once per week, from a six-cubic-yard bin (cardboard) and nine 96-gallon carts (mixed recyclables).

A6(c) Waste minimization efforts

Most of the waste generated by the airport staff is in the office areas; however, this is a small portion of the overall waste, which is generated by passengers, tenants, and other airport users. The airport administrative office has recycling bins located throughout the office areas, as well as co-located with every printer. Employees are encouraged to use less paper through using network storage for electronic files as well as double-sided printing. The airport also provides recycling in the terminal and operations areas to reduce waste sent to the landfill.

Passenger waste minimization is typically from recycling efforts related to food and beverage items (e.g., cans, bottles, and plastic containers) and paper (e.g., boarding passes, newspapers, and magazines).

Many of the tenants recycle paper, plastic, and cans, to reduce waste. Some of the waste minimization efforts undertaken by one or more tenants include:

- Company policy to reduce source materials and zero-waste initiative
- Double-sided printing and electronic document storage
- Reduce the number of printers and use a “lock print” setting (jobs don’t print unless you go to the printer and confirm the job, which eliminates accidental printing and forgotten print jobs)
- Use of iPads in maintenance areas and aircraft cockpits to reduce printing
- Provide reusable water bottles to all employees
- Water bottle refill stations
- Store miscellaneous excess materials for potential future use

A7 A Description of Program Performance

MLB does not have an official recycling/waste reduction effort; however, the airport has taken many steps to increase recycling and reduce waste.

A7(a) Any recycling, reuse, and waste reduction goals or targets

There are no formalized goals or targets for recycling at MLB. Some of the larger tenants, that are nationwide or international companies, do have formalized corporate waste management programs, which influence local waste/recycling activities.

A7(b) Performance indicators

There are no performance indicators at this time.

A7(c) Description of any community outreach/stakeholder involvement during development or review of the recycling program

As stated previously, there is no official recycling program. The community members that travel in/out of MLB should be aware of the recycling efforts from the recycling bins placed throughout the terminal.

A7(d) Methods of reporting program performance

Presently, there is no reporting on the success of MLB's waste reduction and recycling initiatives. Airport management is aware of the volume of its recycling service, having recently increased that service due to growing participation.

A7(e) Any challenges or barriers to implementation

While the airport has undertaken many recycling initiatives, due to the way trash/recycling are billed, it is hard to track and monitor the airport's performance. A formalized program could be established, but staff time requirements are commonly a challenge to formalizing programs; resources are commonly spent implementing initiatives.

The cost of recycling service is also a challenge. On a per-cubic-yard basis, recycling service is roughly three times as costly as refuse disposal. The airport has had to increase its recycling capacity without reducing its refuse capacity, so there is no economic incentive for increased recycling.

B Waste Audit

A waste audit was conducted over three days in September 2015. The waste audit included sorting through the contents of the refuse dumpsters and recycling carts and bin for contamination (e.g., recyclables in waste bins and vice versa, hazardous materials, etc.), a walk-through of the entire terminal to identify current practices, and a similar walk-through of tenant facilities.

Sorting sample waste revealed many materials that could be recycled or composted, as shown above.

Sorting the waste that was discarded in the dumpsters revealed that more than 70 percent of this trash (by volume) could have been diverted from the landfill through recycling or composting

(see example photo above, which separates paper, plastic and aluminum, compostable materials, and trash). In additional to recyclables, some materials that should not have been discarded included light bulbs and cleaning products.

Sorting recyclable containers revealed that approximately 15 percent by volume was contaminated material (trash in the recycling bin). Some materials found in recycling bins included cell phones, batteries, and leather goods.

B1 Annual Quantity and Composition of Generated Municipal Solid Waste and Construction & Demolition Debris

Waste Management bills MLB based on container volumes and does not track the actual volume or weight of waste and recycling. Currently, in the "airport proper" (north of NASA Boulevard), MLB has the two waste containers (8 yards each) picked up three times a week; one six yard container for cardboard is picked up one time per week. As described previously, there are nine 96-gallon carts for mixed recyclables picked up once per week.

There are no set requirements for construction and demolition materials; however, recycling efforts include recycling all concrete, and recycling metals when possible.

B2 Sources and Activities that Generate Waste

The majority of waste at an airport is generated by passengers, tenants, and airport users. Common waste disposed of at MLB includes:

- Common office/terminal waste: paper, plastic (hard plastic containers and film plastics), cans and bottles, food and food-packaging waste from concessions, and cardboard boxes
- Deplaned and lavatory waste (beverage cups and containers, reading matter, hand towels)
- Construction and demolition waste from construction projects
- Spill clean-up and remediation waste
- Hazardous waste such as batteries, fluorescent tubes, solvents, and paint

B3 Generators (Owners and Facilities/Areas) of Waste Streams

The airport is responsible for collecting waste generated by passengers and airport employees. Additionally, the MAA is responsible for the ramp agents that collect trash from several on-airfield tenants as well as the airlines. Many of the other tenants are responsible for their own trash and recycling disposal. **Figure C-3** depicts the airfield and the locations of waste and recycling bins. In addition to municipal solid waste, the airport and some of the tenants may have hazardous waste and spill waste, as described above. Project-related construction and demolition waste is typically managed by a contractor, under contract to MAA or a tenant. Landscaping waste is managed similarly.

C Review of Recycling Feasibility

C1 Describe the Technical and Economic Factors that Currently Affect the Airport's Ability to Recycle

MLB currently experiences several technical and economic factors that impact the airport's ability to recycle. There is no financial incentive to recycle because the price of recycling service is approximately three times that of refuse service. Additionally, the ramp agents contracted by MAA are hired through a staffing company; this results in turnover and logistical challenges resulting from a lack of institutional knowledge.

C2 Reference and Describe any Federal, State, or Local Guidelines or Policies that Aid or Hinder Recycling Efforts

State law prohibits refuse franchise agreements from including recycling as a related service. This promotes open competition but prevents service providers from defraying some of the costs of recycling with their trash-service revenues. Consequently, as a stand-alone service with relatively low volume, the cost to recycle is substantially higher than the cost to dispose.

The state has established recycling goals, which supports recycling efforts, but there are no penalties for not recycling or contaminated waste (recyclables disposed of in the trash).

C3 Identify any Other Incentives for Implementing/Maintaining a Recycling Program

Presently, recycling isn't incentivized at MLB; however, the recycling program is consistently maintained and participation is generally encouraged.

C4 Identify Logistical Constraints

Educating the public is continually a logistical challenge at MLB as many people throw trash in the recycling bins. Also, as discussed above, hiring contract (i.e., temporary) employees as ramp agents results in increased job turn over and educational challenges. Additionally, MLB has a large footprint and many tenants; it is logistically challenging to coordinate with each and every tenant. Off-airfield tenants are managed separately from on-airfield tenants, and continual coordination with all of the tenants would be burdensome for administrative staff. MLB's airport recycling program has been a success, and frequently MLB's recycling carts are overflowing with the current once-per-week pick-up schedule.

D Operation and Maintenance (O&M) Requirements

MLB janitorial staff is responsible for collecting in-house waste from the passenger terminal. This waste is collected hourly, and recycling is removed from the trash when it is visible. The terminal janitorial staff is also responsible for establishing collection procedures and transporting the waste and recyclables to the disposal containers/bins. Ramp agents are responsible for picking up tenant/airside waste and recycling and placing the refuse in the appropriate bin(s).

Additional responsibilities include:

- The MLB accounting department is responsible for tracking and paying Waste Management bills.
- The terminal staff maintains waste and recycling equipment.
- The operations staff procures waste and recycling containers and contract management of waste and recycling services.

There are currently no metrics utilized to measure the percentage of waste diversion; if these were established, it would likely be tracked by accounting or another administrative department.

E Review of Waste Management Contracts

E1 Describe Current Contracting for Waste Management at the Airport

For waste disposal services, MLB is a commercial customer under the City of Melbourne's exclusive franchise agreement with Waste Management. The charges for Waste Management's refuse services are regulated by the City through a rate adjustment process. Regarding commercial recycling services, Florida law prohibits the franchising of commercial recycling. A business may use any available vendor. MLB uses Waste Management and is billed separately for these services.

For all services from Waste Management, MLB is billed based on container volume and collection frequency. Bills from Waste Management from October 2014 through September 2015 revealed the following fees:

- Recycling: Seven 96-gallon (1/2 cubic yard) recycling carts and one 6-yard bin cost approximately $500 per month for once-a-week collection in October 2014. This decreased to approximately $480 in subsequent months due to a reduced fuel/environmental fee. In April 2015, MLB was penalized $100 due to excessive recycling volume. In June the airport was penalized again, resulting in increased service to nine recycling carts, with a monthly rate of approximately $600 since July 2015. These rates equate to $13.20 per cubic yard of service volume.[2]

- Waste: An 8 yard dumpster is picked up once per week, with a monthly rate of approximately $125 since October 2014. This bin serves a location that is removed from the immediate airport vicinity and does not have direct access to flight services; therefore, it was excluded from detailed study (no waste audit was conducted).

- Waste: Two 8-yard dumpsters are picked up three times a week, with a monthly rate of approximately $750 since October 2014. These rates equate to $3.61 per cubic yard of service volume.

[2] Assumptions: 4.33 weeks per month; 96 gallons = 0.5 cubic yards.

E2 Describe How Existing Contracts Encourage or Impede the Purchase/Use of Environmentally-Preferred Products

The airport's current contracts do not require or recommend the use of environmentally-preferred products; nor do they impede their use.

E3 Identify Tenant Leases and Service Contracts with Corresponding Expiration, Extension, and/or Renewal Dates

MLB has more than 20 commercial business tenants located within the airport fence line and more than 20 located outside of this boundary. Each company has its own lease, with its own time frame. Some businesses have multiple leases for different properties, and there are numerous subleases as well. Many of these tenants are government-contracted companies and require confidentiality regarding lease information; therefore, this information is currently unavailable.

E4 Describe How Waste Handling and Recycling is Funded

Janitorial staff and Waste Management bills are paid through MLB's annual operating budget. Significant expenditures for new materials (e.g., recycling bins, signage) would have to be approved prior to purchasing.

F Potential for Cost Savings or Revenue Generation

The airport may be able to sell scrap metal, particularly from construction and demolition projects. Several tenants sell scrap metals, so that commodity market is present in the area. Waste aircraft fuel and scrap wood are collected by third party(s) which then process and resell these commodities.

G Plan to Minimize Solid Waste Generation

(1) The Airport's Program to Recycle

MLB does not have a formalized program, but does encourage and support recycling in the administrative offices and the airport terminal. **Figure C-4** provides a map depicting waste and recycling bin locations throughout the terminal. The airport and many tenants have been actively recycling municipal solid waste for several years. One of the initiatives recommended below is to formalize this program, which should include establishing targets and goals, delegating specific responsibilities to staff, incorporating guidelines into leases, and formalizing tenant outreach and participation.

(2) The Airport's Plan for a Comprehensive Approach to Reduce the Amount of Waste Being Disposed of in Landfills

Many initiatives were identified that would advance MLB's waste reduction and recycling efforts. These initiatives include:

- **Formalize and Broaden the Recycling Program:** Embrace a top-down approach to the recycling program to be implemented by upper management and encourage employee

participation. The program should incentivize waste reduction, diversion and recycling. Identify targets and goals for waste diversion and recycling, as well as relevant waste reduction methods (reusable toner cartridges, rechargeable batteries, reusable packaging, etc.) Track success with a Key Performance Indicator such as disposed-waste volume per enplaned passenger.

- **Develop an Awareness Campaign:** Educate passengers and employees about proper recycling practices; this should include posters and/or improved signage throughout the terminal. Waste Management has a program to educate employees through a one-hour seminar that could be held multiple times to cover different employee shifts.
- **Periodic Monitoring:** Conduct a monthly walk-through of MLB facilities to monitor the progress of the waste reduction and recycling program.
- **Develop Environmentally Preferable Purchasing Procedures:** Establish procedures for purchasing materials with recycled/bio-based content, low toxicity, or other environmentally-friendly products. Consider Green Label equipment in purchasing guidelines or other equipment that has low emissions and/or low sound levels.
- **Provide Additional Recycling Bins:** Co-locate recycling receptacles with waste receptacles, and use same-sized receptacles where practical.
- **Provide Hand Dryers:** Install high-efficiency hand dryers in all restrooms, and reposition towel dispensers, to reduce paper towel use.
- **Improve Handling of Deplaned Waste:** Work with airlines to ensure deplaned waste is appropriately recycled. Provide bins and signage where needed.
- **Enhance Tenant Engagement:** Coordinate with tenants to consolidate materials and improve economies of scale.
- **Evaluate Feasibility of Organics Processing:** Consider an airport-wide composting program; this could potentially be coordinated with an existing tenant that has its own composting or anaerobic digestion program.
- **Update Contract Language:** Revise existing contract language to establish waste diversion or recycling goals for all tenants, with annual audits and training provided by MAA or a qualified third party.
- **Host a Periodic Universal Waste Collection Day:** Coordinate with Waste Management to host a periodic (recommend quarterly or semi-annually) collection day for universal waste. Provide an opportunity to airport employees, tenants, and the local community to drop off materials such as batteries, lightbulbs, pesticides, and more.
- **Charitable Donations:** Collect lost and found items (e.g., jackets, sunglasses), as well as materials abandoned at the TSA checkpoint, and donate these materials to a local charity, as allowable.

(3) Other Factors to Consider

The airport should consider future development projects, and whether any of the initiatives would become obsolete or if there would be synergy in implementing the initiative as part of a future project (e.g., develop signage when replacing other airport signs).

The airport has several tenants that are extremely proactive with their recycling programs. Working with these tenants could rapidly improve the airport's overall recycling practices. For

example, there is a tenant that now provides organic processing, but does not have enough organic material for an anaerobic digester at this time. If the airport were to coordinate with the administrative staff (for kitchen refuse) and the airport restaurant, MLB may be able to establish a composting program utilizing the tenant's composting facility. Several tenants have formal recycling programs that could potentially be used or adapted by airport staff.

(4) Does the Plan Require Capital Improvements?

This plan would not require any significant capital improvements. The most significant investment would be providing additional in-house recycling receptacles, and this could be implemented as a phased-program to be purchased when there is available operating budget.

(5) Describe any Plan Recommendations that May Conflict with Existing Plans and Programs

The recommended plan is flexible and would allow MLB to implement initiatives when it is financially and logistically feasible. Many of the initiatives could be implemented in phases, such as adding recycling receptacles; or in conjunction with other capital improvement projects, such as:

- Installing hand dryers when renovating restroom facilities.
- Adding outdoor bin enclosures or pads when repaving or modifying landscaping.
- Creating space for receptacles when remodeling kitchen and break-room areas.

Establishing performance targets and goals provides a format for the airport to track and measure performance; reassess when targets or goals aren't met; and adapt the program to the present and future needs of MLB.

(6) Discuss How Recycling will be Contemplated and Implemented as Part of New Development Projects

MLB should review the formalized program annually and identify whether it needs to be revised or updated to meet current goals or new goals established in the future. The airport's plan should document the process and requirements for including waste reduction in new development projects as well as establishing goals for utilizing recycled/repurposed materials (as applicable). The LEED criteria provide a rich source of ideas for waste reduction techniques during construction and operation of new facilities, and *LEED for Existing Building O&M* (LEED EBOM) provides ideas for waste reduction at existing facilities.

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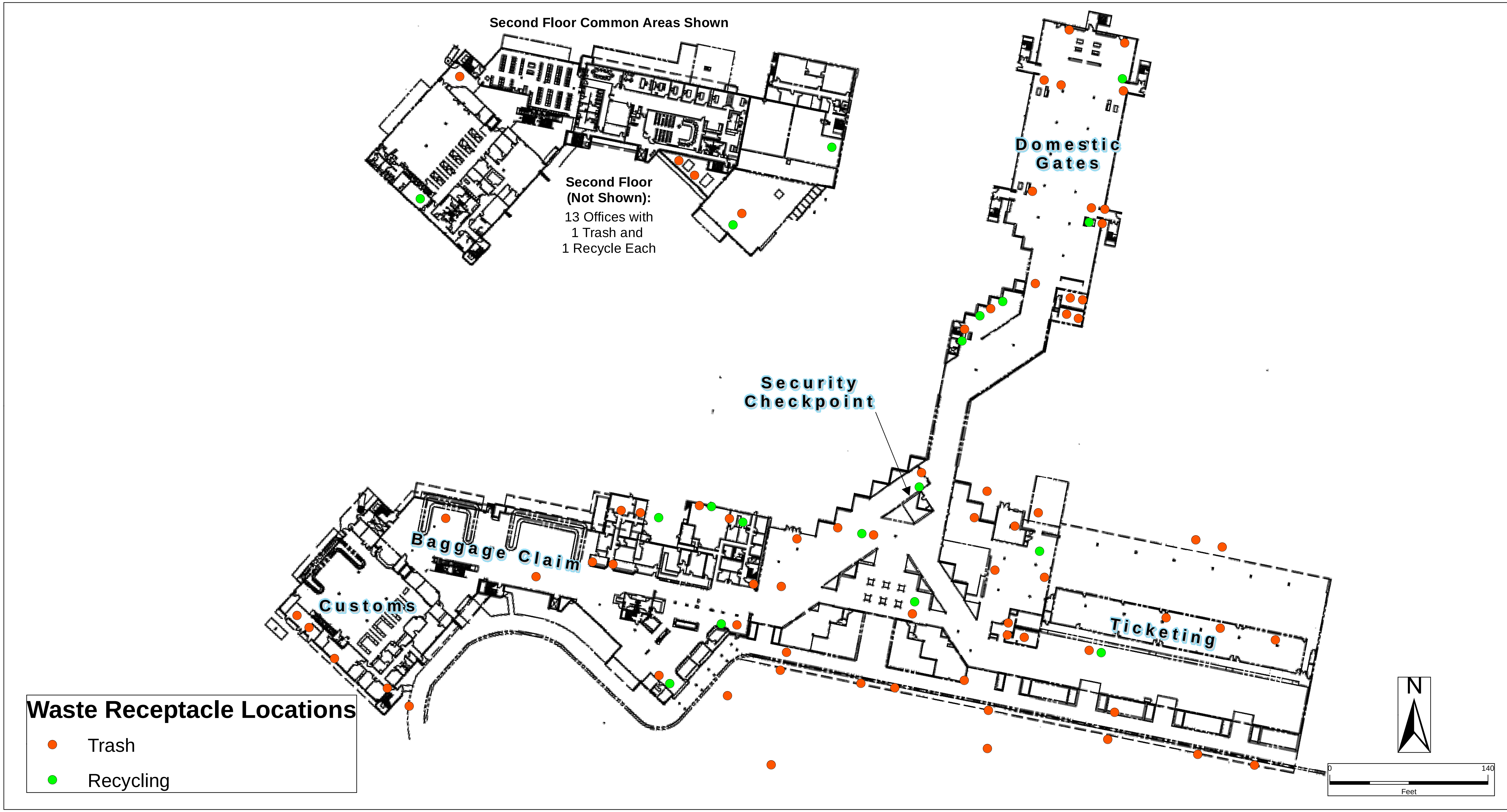

Figure C-3
Approximate Waste and Recycling Locations in Passenger Terminal

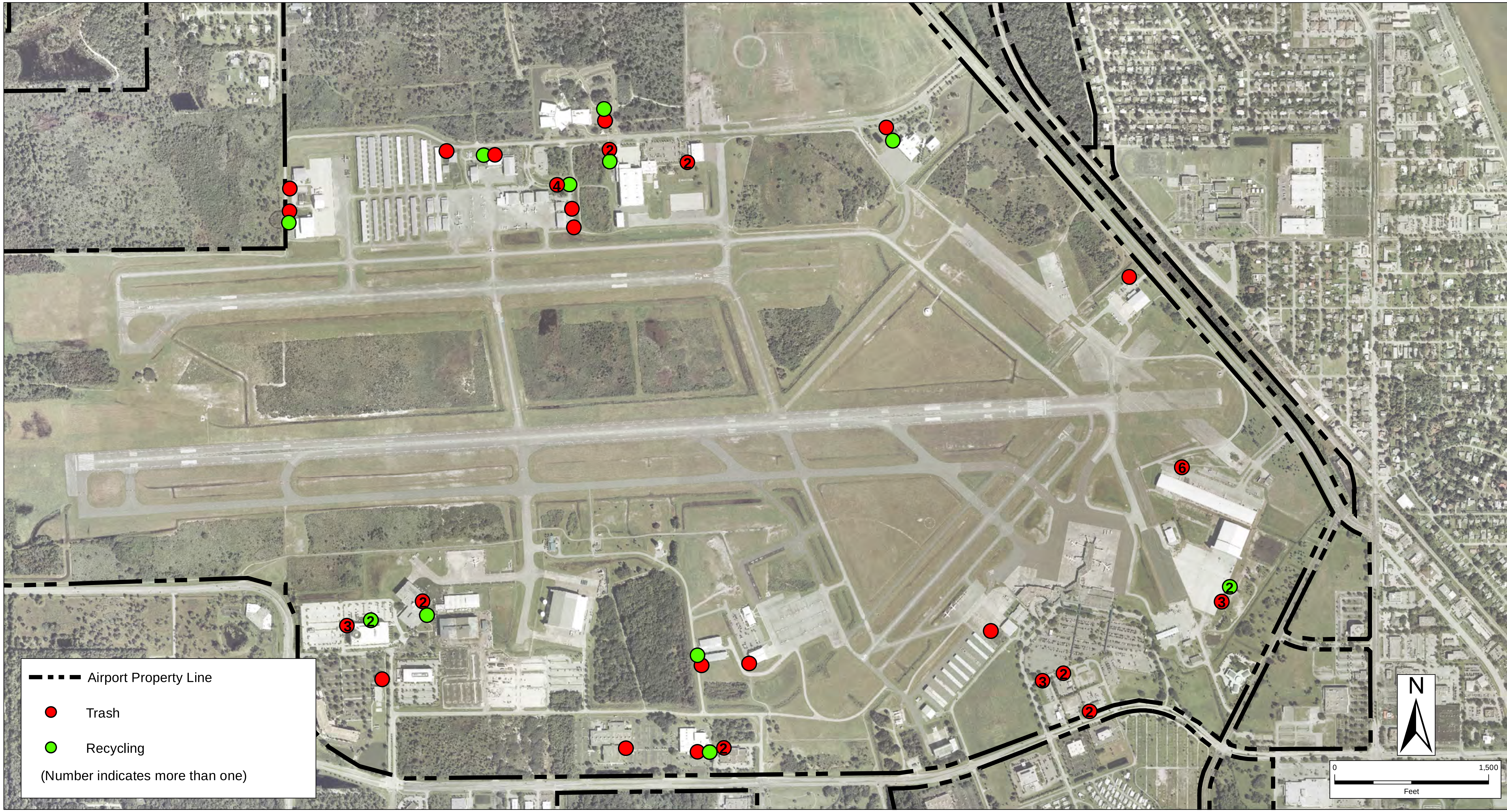

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Figure C-4

Approximate Waste and Recycling Locations